

INFORMATION AND STRUCTURE - A CASE STUDY: THE BATTLE OF SECOND MANASSAS

**A MONOGRAPH
BY
Major George B. Hull
Infantry**



**School of Advanced Military Studies
United States Army Command and General Staff
College
Fort Leavenworth, Kansas**

First Term AY 96-97

Approved for Public Release Distribution is Unlimited

DTIC QUALITY INSPECTED 1

19970505 167

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

| | | | | |
|--|---|--|---|--|
| 1. AGENCY USE ONLY (Leave blank) | | 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED MONOGRAPH | |
| 4. TITLE AND SUBTITLE Information and structure - A Case Study: The Battle of Second Manassas. | | | 5. FUNDING NUMBERS | |
| 6. AUTHOR(S) Major George B. Hull | | | | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) School of Advanced Military Studies Command and General Staff College Fort Leavenworth, Kansas 66027 | | | 8. PERFORMING ORGANIZATION REPORT NUMBER | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Command and General Staff College Fort Leavenworth, Kansas 66027 | | | 10. SPONSORING/MONITORING AGENCY REPORT NUMBER | |
| 11. SUPPLEMENTARY NOTES | | | | |
| 12a. DISTRIBUTION/AVAILABILITY STATEMENT Distribution Unlimited | | | 12b. DISTRIBUTION CODE | |
| 13. ABSTRACT (Maximum 200 words) See Abstract page in monograph | | | | |
| 14. SUBJECT TERMS | | | 15. NUMBER OF PAGES | |
| | | | 16. PRICE CODE | |
| 17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED | 18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED | 19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED | 20. LIMITATION OF ABSTRACT UNLIMITED | |

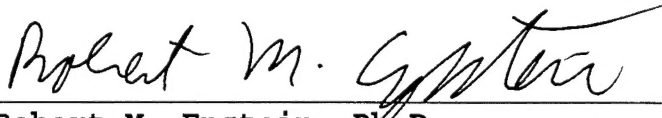
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Major George B. Hull

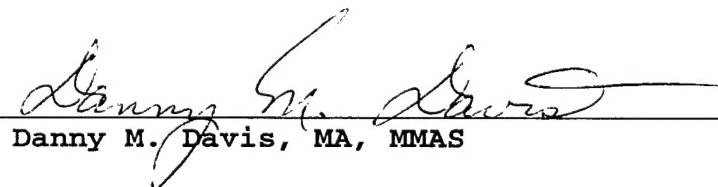
Title of Monograph: *Information and Structure--A Case Study: The
Battle of Second Manassas*

Approved by:



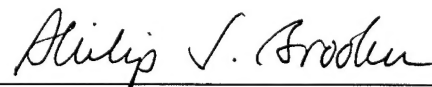
Robert M. Epstein, Ph.D.

Monograph Director



COL Danny M. Davis, MA, MMAS

Director, School of
Advanced Military
Studies



Philip J. Brookes, Ph.D.

Director, Graduate
Degree Program

Accepted this 20th Day of December 1996

Information and Structure
A Case Study: The Battle of Second Manassas

A Monograph
by
Major George B. Hull
Infantry

School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

First Term AY 96-97

Approved for Public Release: Distribution is Unlimited

Abstract

Information and Structure — A Case Study: The Battle of Second Manassas by Major George B. Hull, USA, 62 pages.

This paper explores the impact that an army's structure has on its ability to process information and achieve victory on the battlefield. It discusses the following questions. What is information and how is it related to organizations? How does organization structure facilitate or obstruct the flow of information? How does organizational structure affect the ability of the senior leader to make correct decisions? To explore these issues further, they are considered in the context of the American Civil War Campaign of Second Manassas.

Information is a critical organizational resource. Information is a collection of data which has content, meaning and purpose. Organizational structure affects the flow of information within the organization. Organizational structure designates reporting relationships, managerial hierarchy, and the span of control of managers and supervisors. The structure forms the conduits of communication, coordination, and integration of effort among the organization's departments.

Communications is the organizational nervous system through which information is transmitted and shared. An organization's structure affects its communications environment. Information may be interpreted, filtered, held, changed, consolidated, delayed or blocked at each level of managerial hierarchy or when moving laterally between organizational sub-units. Information may also be misinterpreted or corrupted by mismatched mental models between the sender and receiver of the information.

The effects of organizational structure on information flow are examined in the context of the American Civil War Battle of Second Manassas. In August 1862, General John Pope's Army of Virginia opposed General Robert E. Lee's Army of Northern Virginia in Western Virginia. During this battle both armies employed a similar hierarchical structure, though they differed with respect to the way their cavalry was organized. In Lee's army the cavalry was centralized under Major General Jeb Stuart who reported directly to Lee. The cavalry in Pope's army was subordinated to three separate corps commanders. Pope did not have direct control over his cavalry.

The structure of armies can influence the outcomes of battles. Pope's experience during the Battle of Second Manassas shows organizational structure does affect information flow. Pope failed to receive key information on several occasions and received it many hours late in other instances. His army possessed information he needed but it was blocked at organizational boundaries. Lee had direct control of his cavalry. There were no intermediaries to block information flow. Lee had a correct view of the battle and at the decisive time committed Longstreet's command into the Union flank to win the battle.

This paper concludes that a commander's ability to accomplish his mission is influenced by the structure of his organization. Structure defines the organization's communications pathways. It determines the amount of hierarchy, the amount of sub-unit compartmentalization, and the span of control of the organization's leaders. Structure determines an organization's communications environment. Each of these elements affects information flow within the organization, and thus directly affects the commander's ability to correctly visualize the decisive point on the battlefield to achieve victory.

Table Of Contents

| | |
|---|----|
| Introduction..... | 1 |
| Information — The Foundation of Organizational Intelligence | 4 |
| Organizational Structure and Communications..... | 8 |
| Organizational Structure and Command..... | 12 |
| Information, Structure and the Battle of Second Manassas..... | 14 |
| Conclusions..... | 37 |
| Appendix A - Battle Maps..... | 44 |
| Appendix B - Organizational Diagrams..... | 49 |
| Notes..... | 51 |
| Bibliography | 57 |

Introduction

"The teams and staff through which the modern commander absorbs information and exercises his authority must be a beautifully interlocked, smooth-working mechanism. Ideally, the whole should be practically a single mind.¹

— General Dwight D. Eisenhower

War is the ultimate contest between nations. It pits the creative and organizational skills of one society against another. Despite today's fascination with machines and technology, war remains a battle between rival armies each intent on containing or destroying the other. In most wars, armies fight with roughly equivalent capabilities in technology and weapons. Success in battle often goes to the army that is best organized structurally to acquire and process information and then act decisively on it to gain a competitive advantage on the battlefield.

Armies gain that competitive advantage by massing combat power at the decisive point on the battlefield. To do this the commander must first identify the decisive point, then identify the decisive time, and finally select and arrange the necessary combat forces on the battlefield to generate combat power. All of these activities require information. This information is time sensitive and its usefulness degrades quickly as it ages. To be successful an army must acquire, process, identify and transmit the right information to the correct commanders and staff officers to enable them to make the decisions that bring victory.

The commander's need for information has influenced the structural evolution of armies. Classical and dynastic field armies were small and their battlefields compact. This kept their organizational requirements modest. The army's commander could usually see and directly control the forces under his command using aides to convey messages to his

subordinate commanders. Weapons were still relatively simple with limited ranges and slow rates of fire. Thus, at Leuthen on December 5, 1757, Frederick the Great could personally command a force of 35,000 Prussians in combat with the Austrians. Riding about the battlefield on his horse, Frederick was able to personally acquire the information he needed to make decisions and control his army. The resulting victory has been called Frederick the Great's finest.²

However, in the late 1700's the confluence of changes in society, politics, economics, technology, military organization and doctrine changed armies. In response to the changes, the foundations of the modern military hierarchical structure evolved. In the early 1800's, Napoleon demonstrated the decisive use of large field armies in coordinated, distributed maneuver carrying out the earliest operational campaigns. By the mid-1800's, the fruits of the industrial revolution allowed ever larger armies to be equipped, sustained and moved by rail during campaigns. The telegraph allowed efficient coordination of the operations of independent field armies as they executed campaigns. Advances in weapons technology, such as rifled muskets, breech-loading rifles, and repeating rifles increased lethality and forced armies to disperse on the battlefield. Commanders of large field armies could no longer personally see or control their forces on the battlefield. Thus, by 1864 in the American Civil War, General Grant was overseeing the operations of five Union Armies operating over vast distances in a coordinated campaign designed to break the Confederacy and force its surrender.

Over the past two hundred years the battlefield has grown in space, time and complexity. As it has done so, the information needs of commanders have grown apace. Fifty years of effort to produce automated information systems to enhance the ability to

acquire, process, identify and transmit the right information to the correct commanders and staff have produced mixed results. Some would say that despite the tremendous investment in automated command and control systems, today's armies are no more capable of dealing with the information needed for command than their predecessors of the eighteenth century.³ Could it be that in the attempts to find a technological solution, armies have overlooked more fundamental relationships?

The success or failure of an army in war is often attributed to the commander's particular personal qualities or those of his key leaders. But as Peter Senge explains in The Fifth Discipline, the structure of the system influences behavior within the system. Senge asserts that different people in the same system structure tend to produce qualitatively similar results.⁴ Robert M. Epstein in examining the evolution of the army corps in the American Civil War argues that the reason armies succeed or fail on the battlefield is influenced by the structure of the armies. He observes that "the structure of field formations can determine whether information is passed quickly enough, units are moved fast enough, [or] combat power used with adequate effect."⁵

This paper will explore the impact that an army's structure has on its ability to process information and achieve victory on the battlefield. What is information and how is it related to organizations? How does organization structure facilitate or obstruct the flow of information? How does organizational structure affect the ability of the senior leader to make correct decisions?

To explore these issues further, they will be considered in the context of the American Civil War Campaign of Second Manassas. It might seem that few lessons for today could be derived from such a study. However, today's military organizations still

reflect the hierarchical structure of military organizations that evolved in the nineteenth century. The nineteenth century saw the development of divisions, corps and field armies. Likewise, the fundamental combat branches of infantry, cavalry, artillery, and engineers were all well established. In the hundred and thirty years since the American Civil War, advancing technology has changed many things in warfare. But it has not changed the method of organizing armies in a hierarchical structure that facilitates the flow of information to a commander and enables him to command and control widely dispersed formations. Technology may compress the time in which information flows today, but that information is still subject to the influences of the same organizational friction seen in the Civil War.

The Duke of Wellington once observed that “the whole art of war consists in getting at what lies on the other side of the hill... ”⁶ This quest for information is one of the principal activities of war and a prime occupation of all commanders. The structure of an army has a great impact on how well it obtains and processes battlefield information. The army that can discover the enemy’s intentions quickly, get that information back to its commander so that he can formulate and issue orders, and then act on those orders will have a notable edge in battle. In short, the side with better command, control and intelligence enjoys a significant competitive advantage in war.

Information — The Foundation of Organizational Intelligence

Information is a critical organizational resource; it is the lifeblood of organizations. On the battlefield it provides leverage. The commander constantly seeks it to provide himself with options. The quest for information is as old as war itself. Twenty-five

hundred years ago Sun Tzu advised his readers of the efficacy of sending spies ahead of an army to gather information.⁷ Modern armies devote many resources to acquiring, processing, and transmitting information concerning both the status of their own forces and those of the enemy. Observers of military failure often attribute the cause to intelligence failures, or put another way, the failure to acquire or use information that might have been available. But what exactly is information? How is information different from data or knowledge?

Information is a complex abstraction which in general usage can mean many different things. Organizations often treat information as a concrete, stable thing that must be managed. In this view, information is a commodity which must be communicated within an organization. The organization's focus becomes information storage, retrieval and transmission. This view understates the real, dynamic nature of information. Information has content, meaning and purpose. Many times, information has time value and becomes less useful with age. Because information is dynamic, it will be useful to different people in an organization at different times. The American Heritage Dictionary serves as a useful starting point to explore the meanings of this abstract concept. It defines information as:

1. Knowledge derived from study, experience, or instruction.
2. Knowledge of a specific event or situation; intelligence.
3. A collection of facts or data: *statistical information*.
4. The act of informing or the condition of being informed; communication of knowledge.⁸

The dictionary defines information in terms of data and knowledge but fails to explain their relationship.

Data, information and knowledge are different facets of the same complex structure. They are interrelated concepts that may be understood in either a personal or organizational context. One might view data, information and knowledge as forming a continuous, hierarchical relationship that leads to intelligence (*Figure 1*).⁹ The boundaries in this hierarchy are fuzzy and depend on one's point of view. In such a hierarchy, data are basic facts and figures. Information is a collection of organized data. It is data that has been given structure through analysis, synthesis and evaluation. Viewed another way, information resolves ambiguity. Information is the building material of knowledge. Knowledge is information put to use in a personal or organizational context. Information becomes knowledge when it is internalized and placed in the framework of previous information and experience. Anytime new information is combined with previously known information, new combinations may be understood and new insights gained.

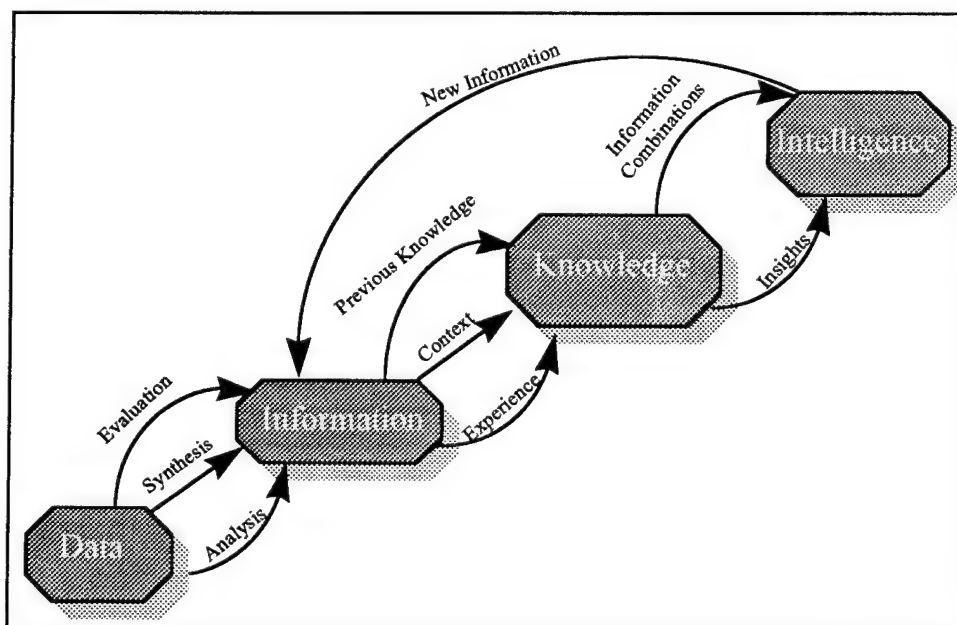


Figure 1 - Information: A Renewable Resource

The ability to perceive combinations of information which lead to insights and subsequently to further combinations of information is one measure of intelligence.

Intelligence¹⁰ is the ability to receive information, interpret it according to internal structures, then combine it in an infinite variety of ways with knowledge to generate a variety of actions.¹¹ Intelligence is a function of several things: the total number and variety of connections within and external to a system, communications operating freely within the system, guidance by patterns not detailed control, and a system which is a balance of reliability, randomness and flexibility which allows changes in the system.¹²

Intelligence is the foundation of learning, adaptation and ultimately survival. It is a characteristic of organizations as well as people. An organization gathers data, transforms it into information and knowledge, and then acts on the knowledge it has generated. Knowledge and intelligence within an organization are greater than the sum of knowledge and intelligence of the organization's individual members. Organizational intelligence is a characteristic which emerges from the numerous interactions of the organization's individual members. It is intelligence which gives information its dynamic self-generating nature. Organizational intelligence enables organizations to make use of information to generate new knowledge, learn, adapt to complex environments, and ultimately to survive as an organization. Organizational structure directly affects organizational intelligence as it affects the communication of information among the members of the organization — the source of the organization's intelligence.

Organizational Structure and Communications

Communications is the organizational nervous system through which information is transmitted and shared. Communications is a process that transfers data or information (Figure 2). The process involves a sender or source of information, an encoding of that information for transmission through a communications channel, then decoding of the information, reception of the information by a receiver and finally feedback to the source that the information has been received. At any point, the communications process may be corrupted or interrupted.¹³ The communications process can be affected by differing perceptions and understandings between the sender and the receiver, as well as, by the organizational structure that forms the pathways of communication among an

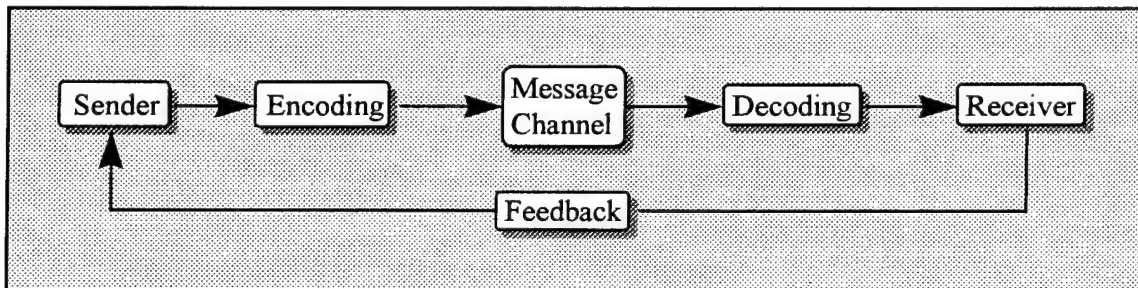


Figure 2 - The Communications Process

organization's individuals and departments.

Individuals perceive and understand their world differently. Each individual's unique education, experiences, and cultural background interact to form mental models. Mental models are fundamental assumptions, generalizations and mental images that determine how someone understands and reacts to his world.¹⁴ An individual uses mental models to simplify his world and preprocess information for quicker understanding and action. Often they exist below the level of awareness. Mental models may be personal or

they may be shared within an organization or part of an organization. Individuals interpret information through the lens of their mental models and therefore, if the models are different will have a different understanding of the information. Mental models fundamentally affect the communications process, for without shared mental models the message will be corrupted.¹⁵

Organizational structure can facilitate or obstruct the communications process. Organizational structure includes aspects, such as levels of managerial hierarchy, departmental boundaries, formal reporting relationships, span of control, and communication and coordination. The organization's structure establishes its communications environment.

Communications between members within an organizational structure fall between two theoretical opposites (*Figure 3*). In the first case, the pure network, all individuals are equal and autonomous. Each person in the pure network can communicate with every other person in the network. There is no leader, nor any central authority. Organizational decisions can only be reached by consensus. A pure network provides for rapid and extensive communication of information. Since no member of the network is more than one step away from any other member, they can gather as much information as they need to make rapid assessments of their situation. The pure network makes possible flexible local control of rapid individual actions. However since each person in the network acts autonomously, it is difficult to coordinate group action.¹⁶

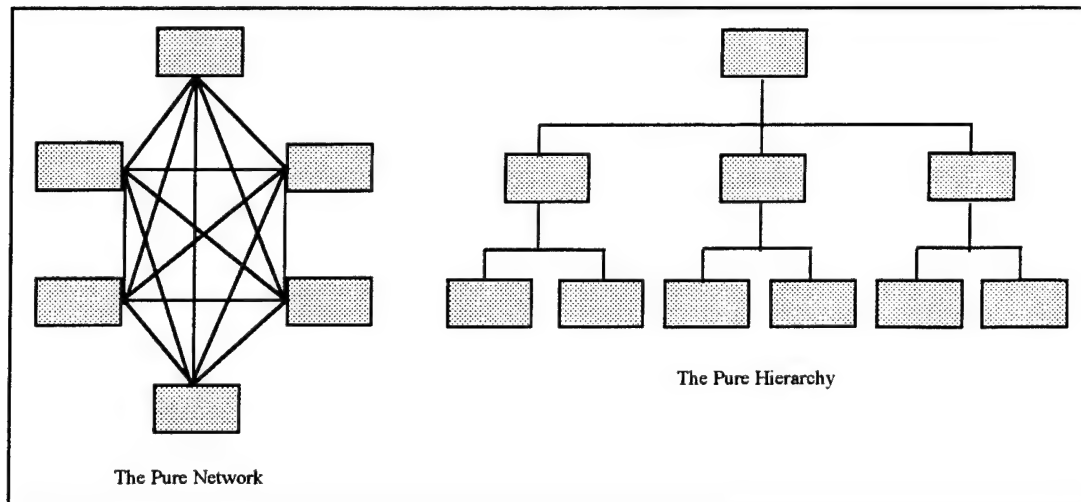


Figure 3 - Pure Network vs. Pure Hierarchy

At the other extreme, is the pure hierarchy. A pure hierarchy has strictly defined lines of communication. Information travels up the chain; decisions travel down the chain. Individuals in the pure hierarchy have access to information only indirectly through defined channels. Intermediate levels slow communications within the pure hierarchy and make assessments less reliable because of filtering at each level. A pure hierarchy emphasizes control and coordinated group action. Pure hierarchies can store commands in the form of doctrine or rules to accomplish repetitive tasks. The strengths of the pure hierarchy that make possible coordinated group action also make them less flexible and less able to adapt to local conditions. Neither of these extremes are found in real organizations.¹⁷

Real organizations are a balance of the characteristics found in hierarchies and networks. An organization must be aware of how its structure affects its communications process. The more levels of managerial hierarchy in an organization, the more likely information will be corrupted or interrupted as it flows within the organization's vertical

structure. Each hierarchical level interprets and filters information. At each level the effects of differing mental models may lead to misunderstandings or different perceptions. The information may be held, changed, or consolidated with other information before it is retransmitted to the next hierarchical level. Transmitting information through numerous hierarchical levels takes time. These effects are accentuated when an organization chooses to impose centralized control and extensive formal procedures to guide work processes.

The division of organizations into sub-units has an effect on the communications process similar to that of hierarchy. Organizations create sub-units to carry out specific functional tasks or to solve span of control problems in the organization. Sub-units create organizational boundaries across which information flows in defined ways.

Communications pathways usually follow the formal reporting relationship that the sub-unit has within the organization's vertical structure. However, sub-units often have information that should be shared with other parts of the organization. If the organizational structure does not have network characteristics with formal, horizontal linkages, cross hierarchical linkages or encourage informal linkages, then information can only be shared by flowing upward to the level of the highest common supervisor and then downward again. The negative effects of hierarchy will have double the impact as the route traveled is twice as long.

In stable environments, the negative effects of managerial hierarchy, centralized control, and departmental boundaries on the communications process may not outweigh the efficiencies gained. The situation is altogether different in complex, unstable environments, such as the battlefield. For an organization to adapt and survive in a complex, unstable environment, it must be capable of solving problems and making

decisions quickly. This requirement puts a premium on the networked communications process. Organizations which function in complex, unstable environments must maximize the horizontal linkages among their sub-units, flatten their hierarchy, and decentralize control. These organizations cannot depend on the intellectual capability of one or a few senior leaders, but must develop and harness the intellectual capabilities of the entire organization.

Organizational Structure and Command

The essence of command is visualizing the battlefield and making decisions that gain a competitive advantage over the enemy by massing combat power at the decisive point and time. Command is a process that requires information in order to coordinate and integrate the actions of many units toward accomplishment of their missions.

Commanders are engaged in an endless quest for information in the hope of gaining certainty about their own forces, those of the enemy, and the environment in which they must fight.¹⁸ This quest for certainty requires great amounts of information.

Organizational structure has great impact on how information flows within the organization. Subordinate units within a military force create boundaries which can inhibit information flow. In many cases, neither formal nor informal horizontal linkages exists between sub-units. Units which fail to share information across horizontal boundaries lessen the efficiency of the organization and could cause it to fail. As information travels through levels of military hierarchy, it may be interpreted, filtered, blocked or consolidated with other information. Information that reaches the commander may be out of date. In larger units information may be misplaced or misrouted. Even when information reaches

its intended destination, mismatched mental models may cause misunderstanding of the information.

A commander's ability to accomplish his mission is influenced by the structure of his organization. Structure defines the organization's communication pathways. It determines the amount of hierarchy, the amount of sub-unit compartmentalization, and the span of control of the organization's leaders. Structure determines an organization's communications environment. Each of these elements affect information flow within the organization, and thus directly affects the commander's ability to correctly visualize the decisive point and time on the battlefield to achieve victory.

During the Battle of Second Manassas, General Robert E. Lee realized the decisive time had arrived at 1600 on August 30, 1862. He committed Longstreet's 32,000 man Command into the Union Army's left flank. Two hours later General John Pope's Army of Virginia was forced to begin a retreat from the battlefield. Lee had been able to visualize the decisive point and time to attack and bring a twenty-two day campaign to a close successfully. How did Lee come to this point? Why did Lee have the information he needed to make the successful decision to attack, while Pope apparently had incomplete or incorrect information which led to flawed tactical decisions?

Robert E. Lee's Army of Northern Virginia and John Pope's Army of Virginia appear at first glance very similar. During this battle, both armies employed a similar hierarchical structure, though they differed in one key aspect with respect to cavalry. Though similar in some ways, their structure differed in their approach to the organizational characteristics of span of control, and communications and coordination. These differences affected information flow within each army and ultimately may have

been a contributing factor to the defeat of John Pope's Army of Virginia at Second Manassas.

Information, Structure and the Battle of Second Manassas

When Abraham Lincoln summoned John Pope from the Western Theater in early June 1862, he sought to unify the actions of three separate armies operating in Western Virginia. Earlier in the spring, all three armies had suffered quick, successive defeats at the hands of Stonewall Jackson during his Shenandoah Valley Campaign.¹⁹ John Pope assumed command of the Army of Virginia on June 26, 1862.²⁰ His orders from Lincoln were to protect Washington from attack, defeat rebel forces operating under Jackson in Western Virginia and aid Major General McClellan in the capture of Richmond.²¹

On its formation, the Army of Virginia was composed of three corps and about 41,000 men.²² The First Corps with 12,500 men, commanded by Major General Franz Sigel had three divisions and an independent brigade. Major General Nathaniel Banks Second Corps with 8,800 was the smallest in the army with only two divisions. Pope's most experienced commander, Major General Irvin McDowell with 20,000 men, had three divisions in his Third Corps. The Union army did not mass artillery in battalion or higher formations.²³ [See Organizational Diagrams at Appendix B]

Sigel was appointed by Lincoln to command First Corps to encourage the support of the German community. Pope lacked full confidence in Sigel's competence. Banks was a politician, serving as Speaker of the House and Governor of Massachusetts prior to the war. Banks appointment to command Second Corps was due to his political service. Banks, whose corps had suffered significant casualties at the Battle of Cedar Mountain on

August 9th, would spend the rest of the August guarding the Army of Virginia's baggage trains. McDowell was the only professional soldier among Pope's commanders. Pope trusted him and respected his experience. He frequently sought McDowell's counsel. McDowell became Pope's primary advisor.²⁴

When Pope assumed command of the Army of Virginia, he found that his cavalry forces were depleted by misuse. Cavalry forces were scattered throughout subordinate commands being used as couriers, orderlies, headquarters guards and for an assortment of other tasks. On August 16th, Pope issued a general order consolidating all cavalry within each of his corps into a brigade responsible to a corps chief of cavalry.²⁵ This order was good as far as it went. However, by placing the cavalry at corps level, Pope inserted a level of hierarchy between himself and his chief means of gaining information on his enemy's movements and activities.

McClellan's Army of the Potomac began its withdrawal from Harrison's Landing on August 15th. Over the next ten days, Pope received elements of three corps from McClellan's army, each with two divisions. These corps were commanded by Major General Samuel Heintzelman, Major General Fitz John Porter, and Major General Jesse Reno. They were smaller and less well-organized than Pope's organic corps. Reinforcements from McClellan's army lacked much of their equipment. Neither Heintzelman nor Porter had wagons or ambulances. Heintzelman had no artillery. Porter had little ammunition. None of these corps arrived with their cavalry. By August 25th, the Army of Virginia had grown to 69,000 men.²⁶

Pope's army was newer than Lee's and needed to build the trust and understanding that leads to the ability to communicate and work together under the stress of battle. The

battlefield is a complex, unstable environment. To succeed on the battlefield, Pope's army would need to acquire and use information efficiently and share it widely. In an uncertain environment, horizontal communications between subordinate commanders are as important as the vertical communications to the army commander. Yet, Pope's army was an assemblage of six corps who had not worked together before as an army. During most of July 1862, after the Army's formation, the army was spread east of the Blue Ridge along a line from Fredericksburg to Culpepper and Sperryville in separate corps areas. Prior to the Battle of Second Manassas, they did not have the opportunity to establish the relationships that lead to informal horizontal communications channels. The army's structure did not create formal horizontal communications channels. The three corps from the Army of the Potomac joined the Army of Virginia just days prior to the Battle of Second Manassas. They may have had some established relationships between themselves that supported horizontal communications, but certainly had little opportunity to establish them with their Army of Virginia counterparts.

Efficient vertical communications are also important to success in a rapidly changing, complex environment. This type of environment puts a premium on efficient, clearly understood communications. Leaders with a narrow span of control can better concentrate on adapting to their rapidly changing environment and then communicating clearly and efficiently. Unfortunately, Pope's span of control encompassed six corps and was twice as large as Lee's.

Another factor affecting strong vertical communication is shared mental models. For a commander to transmit his mental models to his subordinates so that they understand how he views military operations takes time and close contact. However,

Pope remained in Washington for the first month of command and was not accessible to the three corps commanders in the Army of Virginia. Their only opportunity for understanding Pope was through a series of messages from Washington in which he directed them to pursue various operations. They had little opportunity to gain insight into Pope's way of thinking — his mental models. The three corps from the Army of Potomac had even less of an opportunity to understand Pope's mental models than their Army of Virginia brethren. They joined Pope after the tempo of operations leading to the Battle of Second Manassas had increased significantly and were thrust immediately into an active role in operations.

With the forming of Pope's 41,000 man Army of Virginia in late June, General Robert E. Lee found himself in a difficult strategic situation. Lee was positioned between two large Federal armies. McClellan's 100,000 man Army of the Potomac, though dormant since the end of the Seven Days campaign, remained at Harrison's Landing on the Peninsula. Pope's Army lay between Fredricksburg and the Blue Ridge. From his position, he could threaten Virginia's vital rail lines. If these two Federal armies were to operate in concert with one another in an attack on Richmond, or if either moved to unite with the other, Lee's 80,000 man army might be overwhelmed and defeated. Lee had to take action to defeat Pope before McClellan's army could join Pope in purposeful action.²⁷

In early August, Lee noted that McClellan was withdrawing from the Peninsula. With the direct threat to Richmond removed, Lee was free to act. He quickly concentrated 56,000 men in the vicinity of Gordonsville. Lee hoped to move aggressively against Pope's army and destroy it quickly by trapping him between the Rapidan and the Rappahannock Rivers. However, his plans were frustrated when Union cavalry captured

J.E.B. Stuart's adjutant, Major Fitzhugh. Fitzhugh had been carrying Stuart's copy of Lee's orders. With Lee's plans in hand, Pope reacted with alacrity on August 18th and, within two days, repositioned his army along the north bank of the Rappahannock above Kelly's Ford.²⁸

After withdrawing his army north of the Rapidan and establishing a new defensive line north of the Rappahannock River, Pope fought a very competent defensive battle. After capturing Stuart's adjutant, Pope knew he faced Lee's army. Pope did not want to risk a general engagement with Lee until McClellan's reinforcements closed with his army. Lee sought to find an undefended ford, cross his army and attack the Union right. Stuart's cavalry moved steadily upstream along the Rappahannock seeking an undefended crossing site, but found only union cavalry or infantry.

For four days, Lee sought a way around Pope's northwestern flank, but Pope had matched Lee's every maneuver. Lee knew time was short. In a cavalry raid on August 22nd, Jeb Stuart raided Pope's headquarters at Catlett's Station and, among other things, carried away Pope's letter book.²⁹ Lee was privy to all of Pope's communications and knew that McClellan's army was slowly moving from the Peninsula to join Pope. If Lee was going to remove Pope as a threat to central Virginia, he had to act quickly to break the stalemate of the past week before Pope vastly outnumbered him.

Lee sent for Jackson on August 24th with bold action in mind. In a private meeting with Jackson, Lee proposed to split his army, sending Jackson with 24,000 men around the Union's right and far into Pope's rear to cut his supply line along the Orange and Alexandria Railroad. Longstreet, with the Army of Northern Virginia's remaining 32,000 men, would remain along the river, holding Pope's attention for a day or two, then

follow and link-up with Jackson. If the opportunity to strike Pope arose, Lee would seize it, but his principle objective was to force Pope back towards Washington.³⁰

That Lee could hope to carry out such a plan was possible only because he had worked to improve his Army during July after the Seven Days Campaign. Although Lee gave his Army of Northern Virginia its famous name when he assumed command, it had existed in various forms for over a year. During the June battles around Richmond, Lee had been very satisfied with some of his commanders, such as Longstreet and Jackson and disappointed in others, such as McGruder and Huger. Lee also found he had poor lateral communications between divisions, as well as, poor vertical communications between himself and his division commanders. These difficulties had often frustrated his attempts to carry out coordinated army movements during the Seven Days campaigns.³¹ Lee sought to reorganize his army into a more efficient fighting force. In his view, the simpler the army's organization, the more suitable it would be for his purposes.³²

During the month of combat in June 1862, Lee had assessed his subordinate commanders. Immediately after the Battle of Malvern Hill, Lee placed his confidence in three men, James "Old Pete" Longstreet, T.J. "Stonewall" Jackson and J.E.B. "Jeb" Stuart. The men Lee selected were professional soldiers. Jackson and Longstreet both served in the Mexican War prior to separating from the service. Jeb Stuart, though ten years younger than his counterparts, was like Jackson and Lee, educated at West Point. These men shared mutual trust and respect. They became the backbone of the Army of Northern Virginia. To simplify the command and control of his army, Lee placed his infantry divisions into corps sized organizations under Longstreet and Jackson. Confederate law at the time did not permit the formation of corps, so Lee referred to these

two corps as Longstreet's Command and Jackson's Command.³³ Longstreet's Command contained six divisions with 32,000 men, while Jackson's Command had three divisions with 24,000 men. Longstreet and Jackson organized their artillery differently. Longstreet formed the majority of his artillery, 10 batteries, into a corps artillery formation while Jackson massed his artillery at division level.³⁴ In addition, Colonel S.D. Lee commanded a battalion of six batteries which acted as the Army of Northern Virginia's artillery reserve.³⁵ [See Organizational Diagrams at Appendix B]

Lee consolidated his army's cavalry under Jeb Stuart and used it primarily for army reconnaissance, attacking enemy communications and guarding his own.³⁶ Stuart reported directly to Lee. To solve his communications problems, he revitalized his courier and signal services. Lee also encouraged communications between his subordinates and between the staffs of the various command echelons of his army. In particular, Lee expected there to be routine communications between the staffs of various command echelons that did not proceed through the commanders of those echelons.³⁷

Though Lee assumed command of the Army of Northern Virginia on June 1, 1862 it was not a new army. More importantly, its senior leadership had been working together for over a year. In that year, a great deal had been learned. Men came to understand one another. During much of that year, Lee had functioned in one of several capacities that gave him oversight of military operations, first for Virginia, then later for the entire Confederacy. In this role, he had become familiar with the capabilities of the senior commanders of the Confederate army.

After the Battle of Malvern Hill at the conclusion of the Seven Days campaign, the changes Lee made to his army were more evolutionary than revolutionary. Lee

understood the need for strong horizontal and vertical communications. In picking Longstreet, Jackson and Stuart as his senior commanders, Lee selected three men who had worked with each other for over a year and who would become a closely knit team over time. By encouraging communications between staffs outside of normal command channels, Lee's army benefited from a robust information sharing system within his army.

During his time as Military advisor to President Davis, Lee saw most reports from senior commanders and corresponded directly with a number of them. In particular, he corresponded closely and often with Jackson, during the latter's Shenandoah Valley Campaign. Through this correspondence, Jackson had a chance to learn how Lee thought, to gain insight to the mental models that governed Lee's approach to war. Longstreet, Stuart and others in Lee's Army would have a similar opportunity during the crucible of successive battles around Richmond in June of 1862. During this time, Lee was constantly with his commanders. They operated as a team together, making mistakes and enjoying success, but most importantly, learning how they each operated. This shared understanding of mental models, coupled with Lee's narrower span of control, would enable Lee and his senior commanders to rapidly and efficiently share information in the coming battle.

On August 24th, Longstreet took over Jackson's positions near Waterloo Bridge along the Rappahannock. It was the first step of Lee's plan to break the stalemate between the two armies. Jackson pulled his command back near Jeffersonton and prepared to march. Longstreet would hold his position along the Rappahannock and attempt to divert Pope's attention from Jackson's movements. Just before dawn on

August 25th, Jackson left Jeffersonton marching northwestward via Amissville to cross a branch of the Rappahannock at Hinson's Mill Ford.³⁸ [See Battle Maps at Appendix A]

Although Pope had successfully opposed Lee along the Rappahannock, he was not sure of Lee's eventual objectives. On August 24th, he ordered Sigel to send scouts and spies to Front Royal and Thornton Gap to determine whether any Confederate forces were moving in that direction.³⁹ Forces moving into the Shenandoah Valley would very likely do so by moving past either Front Royal or Thornton Gap. Perhaps, because of earlier Confederate efforts to defend the Shenandoah Valley, the Confederate breadbasket, Pope thought it likely that this was Lee's ultimate destination.

At 8:45 A.M. on August 25th, not quite three hours after Jackson began his march, Colonel John Clark, an Aide de Camp to Major General Banks, climbed up to a signal station near Waterloo bridge. Over the next several hours, Colonel Clark sent Banks messages describing the movement of large Confederate forces across the Rappahannock. In his 8:45 A.M. report, Clark reported that the movement was on the road between Jeffersonton and Amissville and had been underway for at least an hour and a half. By 10:30 A.M., Clark reported that the column stretched over 15 miles from Jeffersonton to Flint Hill. It consisted of infantry, artillery, cavalry, ambulances and some supply wagons. After several reports, Banks reported these movements to Pope at 11:25 A.M.⁴⁰ Pope clearly received this report. At 12:30 P.M., he telegraphed General Halleck in Washington, reporting that a large column of infantry, cavalry, and artillery estimated at 20,000 men had left Culpepper on the road to Amissville and Luray or Front Royal. Pope concluded his message by stating that as soon as he determined whether or not they were headed into the Shenandoah Valley he would push McDowell's corps into their rear.⁴¹

Throughout the day on the twenty-fifth, Pope's corps commanders would have their cavalry performing picket and flank guard duty. Sigel placed Colonel John Beardsley's cavalry brigade between his corps and the Rappahannock on picket duty, ordering it to Warrenton later in the day when his corps withdrew in that direction.⁴² McDowell had control of his own cavalry brigade under Brigadier General George Bayard, as well as Bank's cavalry brigade under Brigadier General John Buford. McDowell placed Bayard's forces along the Sulphur Springs road between his forces near Warrenton and the Rappahannock. Buford's forces were placed between Waterloo and Warrenton.⁴³

Late on August 25th, Pope's estimate of the situation had changed. He realized he needed more information. At 9:30 P.M., Pope sent messages to Sigel, McDowell, and Major General Jesse Reno who had just arrived with the Army of the Potomac's Ninth Corps. In his messages to Sigel and McDowell, Pope stated that he believed the whole enemy force had marched to the West and Northwestward for the Shenandoah Valley by way of Luray and Front Royal. He directed Sigel to force passage of the river at Waterloo bridge at daybreak and determine what was in front of him. McDowell was directed to do the same at Sulphur Springs and Reno to do likewise at Rappahannock Station.⁴⁴

On August 26th, Pope sent McDowell a message at 8:10 A.M. informing him that neither Sigel nor Reno would be able to carry out their reconnaissances south of the river. Pope reiterated his need to know what was happening south of the river. He asked McDowell to not only check the area around Sulphur Springs, but also the area around Waterloo. Pope went on to ask McDowell, if out of Bayard's, Beardsley's and Buford's cavalry brigades, some force could not be put together to watch the movements of the

Confederates towards the Army of Virginia's right? Pope gave McDowell the authority to assume command of Sigel's corps if necessary, telling him at the close of the message to "take charge of the front and use everybody you find there."⁴⁵

More than twenty-four hours had passed since Jackson began his march. Despite an early detection of Jackson's march, Pope had gained little information on Jackson's route or intentions. Pope did not have direct control over his cavalry, nor did they report directly to him. His instructions to his corps commanders on the twenty-fifth did not indicate that he tasked them to do anything with the cavalry forces under their control. Thus, on August 25th, the Army of Virginia's cavalry was pulling picket and flank guard duty along the Rappahannock River while, by Pope's estimate, 20,000 infantry, artillery and cavalry marched north around his right flank. The cavalry picketing duty along the Rappahannock could have confirmed for Pope the proximity of large confederate forces south of the river by the presence of noise and campfires. However, none of the corps commanders passed Pope's request for information on Lee's army to their cavalry brigade commanders. Since there was a level of command between Pope and his cavalry, they did not know that their Army Commander needed this information. Since nothing had changed along the river from previous nights, the cavalry had nothing to report.

On the twenty-sixth, McDowell assumed command of Sigel's corps. This two corps task force under McDowell changed the organization of Pope's army. Though the change was intended by Pope to ensure cooperation while the corps were located some distance away from army headquarters, it may have had the opposite effect of creating confusion. This command arrangement would continue until Sigel reached the Manassas battlefield on the evening of the twenty-eighth. This inserted an extra level of command

between Pope and one of his corps commanders. Sigel's reports were sent through McDowell. Hierarchy can affect communications negatively by blocking, filtering or delaying information transmission between levels. It compartmentalizes information flow.

McDowell also assumed command of Bank's cavalry brigade commanded by John Buford. Pope had given McDowell the authority to use any forces he needed with the exception of Heintzelman's corps, in order to force the river and determine what Lee's army was doing. Though McDowell skirmished along the river on the twenty-sixth, he never crossed it. He felt the crossings were too strongly defended. In the end, McDowell did not ask for support from Reno's or Bank's corps. Porter's corps had not yet joined Pope's army.

Pope believed that Lee's army was destined for the Shenandoah Valley. On August 24th, he issued orders to Sigel to determine if there had been enemy movements towards the Shenandoah Valley. He did this even before he knew of a large body of Confederate troops moving past his right. Jackson's move around Pope's right in the general direction of the Shenandoah Valley fit Pope's expectation of Lee's probable course of action. His individual messages to McDowell and Sigel on the evening of the twenty-fifth indicate he believed that the large Confederate force spotted that morning was only the vanguard of Lee's army. Pope's assessment was partially correct. Jackson's movement was the vanguard of Lee's army. However, Lee was not bound for the Shenandoah Valley but for Pope's rear. Until late on the twenty-fifth, Pope took no actions to ensure his estimate of the situation was correct.

On the morning of August 26th, Lee and Longstreet were still located south of the Rappahannock opposite Sulphur Springs and Waterloo. During the morning of the

twenty-fifth, Longstreet had massed forces opposite Waterloo as if to attack, but had not actually done so. To maintain communications with Jackson, Lee had tasked Blackhorse Troop of the 4th Virginia Cavalry to provide a courier service between his headquarters and Jackson.⁴⁶ Knowing Jackson's general situation, Lee sent Jeb Stuart to join Jackson. Stuart departed with his entire command at 2 A.M. on August 26th. Late in the afternoon on the twenty-sixth, Lee and Longstreet concluded that Pope had pulled away from the river. That afternoon, Longstreet began his movement along Jackson's route. They would reunite the army somewhere beyond the Bull Run mountains.

Meanwhile, Jackson, covered on his right by Stuart's cavalry, marched eastward through Salem, White Plains, Thoroughfare Gap, Haymarket, and Gainesville arriving near sunset on August 26th at Bristoe Station. His command covered fifty-four miles in forty hours.⁴⁷ At Bristoe, Jackson cut the Orange and Alexandria rail line and destroyed two trains. A third train detected the ambush, and backed rapidly away to Manassas to give the alarm of the attack at Bristoe. Shortly after 2 A.M. on August 27th, some of Stuart's cavalry, reinforced by a brigade of Infantry from Ewell's Division, seized the massive Union supply depot at Manassas.⁴⁸

At 8:10 A.M. on the twenty-sixth, Pope had asked McDowell to organize a cavalry force from among the available cavalry of Beardsley's, Buford's, and Bayard's brigades to watch the movements of the Confederates towards the army's right. Pope's cavalry was suffering from heavy use during the previous month and poor forage. As a result, many cavalry troopers were no longer mounted. In order to assemble a reasonable size force, the army's cavalry assets had to be combined. At 3:30 P.M. that day, McDowell informed Pope that he had ordered Beardsley's Cavalry Brigade to report to

Buford. McDowell told Pope that Buford would march at dawn on the twenty-seventh, towards Chester Gap to determine what direction the enemy had taken on the army's right.⁴⁹ It would be forty-eight hours after Jackson's march before Pope's chief means of gathering information on the enemy would venture out to see what could be found.

Pope received several reports in the course of the day on the twenty-sixth that might have caused him to reconsider his belief that Lee's army was headed for the Shenandoah Valley. Brigadier General Julius White, commanding a fort at Winchester at the North end of the Shenandoah Valley, reported that cavalry returning from Front Royal at 7 P.M. on the twenty-fifth had not seen any visible signs of the enemy in the region.⁵⁰ At 9 P.M., McDowell forwarded a report from Buford. A citizen from White plains had told Buford that Confederate forces had moved through White Plains in the direction of Thoroughfare Gap. Buford stated that his scouts confirmed this report and also had found large trains moving up from Orleans to White Plains.⁵¹ At 10 P.M., McDowell forwarded a report from Sigel to Pope. Sigel's scouts reported that from daylight until 4 P.M. there had been a continuous line of troops marching eastward through White Plains.⁵²

Of even greater importance is a message that Sigel received from his scouts that may not have reached Pope. On the afternoon of the twenty-sixth, Sigel states that his scouts reported to him that Jackson was marching by way of Thoroughfare Gap to Manassas. It is not clear from Sigel's report if this message was forwarded to Pope.⁵³ Pope's official report makes no mention of such a report from Sigel. The Official Records do not contain a copy of a message on this subject between Sigel or McDowell and Pope. Pope apparently did not receive Sigel's report. It is possible this message never made it past McDowell's headquarters.

By midnight on the twenty-sixth, Pope knew he had a significant force in his rear. In a message to McDowell, Pope stated that the army's communications had been interrupted by enemy cavalry near Manassas. He asked McDowell to confirm Sigel's report that the enemy's rear guard was at Orleans with his main body encamped at White Plains. Pope told McDowell that he believed that the force in his rear to be 10,000 to 15,000 men in size. However, Pope admitted he did not know where they were or what they were doing, nor did he know the plans of the rest of Lee's army. He closed by reiterating to McDowell his request for information made sixteen hours earlier. Pope still wanted to know if Lee had left the Rappahannock River.⁵⁴

Nearly two days had passed since Jackson began his march. During that time, Pope made a number of unsuccessful attempts to gain information. Information is a critical resource to a commander. Without it, his decisions will be flawed. Pope could not get the information he wanted in a timely manner. McDowell controlled all of Pope's cavalry, but that unity of command had not yet produced any positive benefits. Buford's and Beardsley's Cavalry Brigade, which Pope had requested at 8:10 A.M. on the twenty-sixth, would not leave until dawn on the twenty-seventh, nearly twenty-four hours later. Small scouting parties sent in useful reports, but these reports had not yet coalesced into a distinct picture for Pope. They came from sources Pope did not know and, therefore, lacked authority. Pope would continue to fit them into his existing mental model.

On the twenty-seventh, Pope moved Sigel's and McDowell's corps towards Gainesville to cut off the forces in his rear which he believed to be a large scale raid. Pope believed these forces would attempt to retreat and rejoin Lee's main army on the Western side of the Bull Run mountains. He also directed Heintzelman's, Reno's and Porter's

corps to move up the Orange and Alexandria railroad in search of the enemy. In the course of this movement, Hooker's division of Heintzelman's corps ran into Jackson's rear guard at Bristoe at 2 P.M. Pope would learn from this action that he had Jackson's entire command in his rear.⁵⁵

Buford's cavalry departed for Salem and White Plains at dawn on August 27th. At Salem, Buford found Longstreet and engaged his columns, forcing Longstreet to deploy and halt for about an hour. Buford then withdrew northward through White Plains. At White Plains, he determined that Jackson had passed through earlier enroute to Thoroughfare Gap. Buford returned to the Warrenton area around 9 P.M. the same evening.⁵⁶ McDowell's official report mentions Buford's action on the twenty-seventh but makes no mention of passing the information to Pope. None of McDowell's messages to Pope on the twenty-seventh or twenty-eighth mention Buford's actions.⁵⁷ Pope's official report makes no mention of the cavalry on the twenty-sixth or twenty-seventh except to state that the cavalry, ordered on the morning of the twenty-sixth to go through Thoroughfare Gap, had made no report.⁵⁸

While Buford's cavalry scouted between Salem and White Plains on August 27th, Jackson's Command spent the day at Manassas replenishing themselves from the Union stores. Stuart's cavalry screened Jackson's forces, policing up Union couriers and others unfortunate enough to stumble into Jackson's area. In addition, Stuart scouted the movements of Union formations and alerted Jackson of their approach. Lee was aware of Jackson's situation and reported his capture of the Union supply depot to President Davis early that day via telegraph a few miles from Salem.⁵⁹ Lee and Longstreet would continue

to march along Jackson's route at a measured pace, stopping the column for the night near White Plains.

On the night of the twenty-seventh, Jackson withdrew from Manassas by multiple routes to conceal his destination. He would reunite his command on the twenty-eighth in a stand of thick woods on the old Manassas battlefield near Groveton. After Hooker's battle in the late afternoon of the twenty-seventh, Pope determined that Jackson was at Manassas. That night, he issued orders for his army to concentrate at Manassas Junction by dawn on the twenty-eighth in order to attack Jackson at Manassas. By the time Pope's forces arrived at Manassas, Jackson had moved to Groveton, but Pope, deceived by Jackson's multiple march routes would believe he had gone to Centerville. Pope subsequently issued orders to his corps to mass at Centerville.

By the twenty-eighth, Jackson's forces were arrayed along an abandoned railroad line at the base of Sudley Stone Ridge nearly parallel to the Warrenton Turnpike near Groveton. Stuart's cavalry had captured several couriers. These couriers provided Jackson with copies of Pope's orders to his army. During the time Jackson's and Longstreet's Commands were separated, Stuart was working directly for Jackson. Lee believed Jackson would need the cavalry more than he and Longstreet and committed Stuart's entire cavalry division to Jackson until the army was reunited. Stuart understood his mission to protect Jackson from surprise and performed this mission well. Jackson knew what Pope was doing.

Pope knew that Jackson was in his rear with at least the divisions of Ewell and A.P. Hill.⁶⁰ However, Pope did not know Jackson's location. Pope believed, but was not sure that the remainder of Lee's army was somewhere near White Plains. He still believed

Jackson was attempting to retreat to join Lee's army on the West side of the Bull Run mountains. McDowell had information Pope needed. Buford had returned to McDowell's headquarters at 9 P.M. on August 27th to report on Longstreet's and Jackson's movements. McDowell apparently did not pass this report to Pope, perhaps because Buford's report arrived at the same time as Pope's order to march to Manassas to attack Jackson. Regardless of the specific reason for failing to forward the report which Pope had been waiting on for over thirty-six hours, Buford's critical information was blocked at McDowell's headquarters and would never reach Pope.

Pope's forces found Jackson around 6 P.M. on the twenty-eighth, when Jackson attacked King's division of McDowell's corps as they marched in front of his position. Pope learned of this battle at 10 P.M., when a messenger from King's division reached him.⁶¹ In a series of messages on the night of the twenty-eighth, Pope told his corps commanders that McDowell had intercepted Jackson's retreat and directed them to concentrate near Groveton.⁶² Pope believed that McDowell and Sigel were west of Jackson and between him and Thoroughfare Gap. He thought Porter's, Heintzelman's and Reno's corps were east of Jackson. He believed he could defeat Jackson, before Longstreet could reinforce him.⁶³ Pope would be incorrect in each of these beliefs.

As Pope's army maneuvered to trap Jackson first at Gainesville, then at Manassas, and finally at Centerville, Pope appears to have lost track of where his forces were positioned. On the evening of the twenty eighth, Sigel was moving towards Manassas enroute to Centerville when he received Pope's order to move to Groveton. He was not at Gainesville as Pope thought. Sigel would end up on the morning of the twenty-ninth in the army's center directly opposite Jackson. McDowell, with the exception of one

division was following Sigel. Porter was at Manassas. Upon receiving orders at 3 A.M. on August 29th to move to Centerville, he would elect to travel by way of Gainesville to avoid the clogged roads between Manassas and Centerville where Reno's and Heintzelman's corps lay. In the end, Pope would not have Jackson trapped between two large wings of his army as he believed, nor would he have isolated Jackson's communications with Thoroughfare Gap.⁶⁴

By August 28th, Pope's span of control had expanded to six corps. This meant he had to track and arrange the movements of six large formations on limited roads in the area. Pope had a small staff of aides to assist him, but their role was primarily to act as messengers and couriers to transmit his orders and bring him subordinates' reports. Pope's army staff primarily handled logistical and administrative matters. The number of corps and the distance between them prevented Pope from engaging in frequent personal communications with his corps commanders. He communicated his instructions primarily in writing or by telegraph. The lack of additional communications connections within Pope's army, such as provided by modern operations and intelligence staffs, prevented information from reaching him quickly through multiple sources. His wide span of control may have reduced his ability to make effective decisions. Pope was restricted to a single slow, hierarchical information channel to each of his corps. This situation clouded Pope's situational awareness. Pope would not understand the true disposition of his forces until midmorning on the twenty-ninth. By then, it was too late to carry out his original plan.

Early on the morning of August 29th, Jackson sent Jeb Stuart westward to meet Longstreet and Lee and guide them to Jackson's Command. Stuart met Lee between Haymarket and Gainesville. He spent an hour talking with Lee, updating him on Jackson's

situation. Stuart departed after describing the route for Lee to take and informing Longstreet of Jackson's recommended location for Longstreet's Command. About 10:30 A.M., the lead elements of Longstreet's Command arrived at the Manassas battlefield and assumed their position on Jackson's right in a thick grove of woods. Longstreet's Command would form an angle of 160° to Jackson's Command. Longstreet placed his artillery at the left of his line between his and Jackson's command.⁶⁵ Later, Colonel S.D. Lee, commander of the Army of Northern Virginia's reserve artillery, would place his artillery battalion nearby.

Shortly after the arrival of Longstreet's lead divisions, Stuart's cavalry detected the approach of a major Union force while performing reconnaissance along the road from Gainesville to Manassas. This was Porter's corps, who was under instructions from Pope to move to Centerville. Lee and Longstreet were notified immediately and soon arrived for a personal reconnaissance. Stuart's cavalry quickly deployed two artillery pieces and fired on Porter's lead elements. Other cavalymen drug branches up and down the road to deceive Porter into believing a large infantry force was marching just in front of him. The ruse worked. Porter stopped. Longstreet deployed a brigade to guard his right flank against Porter's advance. Without cavalry, Porter did little to develop the situation. He deployed skirmishers and remained immobile along the Manassas-Gainesville road the rest of the day.

Longstreet's arrival had not gone undetected. In anticipation of Longstreet's arrival, McDowell had sent a regiment of cavalry and Major General Ricketts' division to block Thoroughfare Gap. Ricketts had contested Longstreet at Thoroughfare gap for four hours on the evening of August 28th before being forced to withdraw. McDowell, who on

the evening of the twenty-eighth, had gone to look for Pope, but had gotten lost, never reported this action to Pope, perhaps because the information never reached him since he was not at his headquarters that night. At 9:30 A.M. on the twenty-ninth, Buford reported to Ricketts, that forty-five minutes earlier, he had observed seventeen regiments of infantry, one battery, and five hundred cavalry at Gainesville on the Centerville road. Ricketts' forwarded this message to McDowell at 11:30 A.M. McDowell would not forward it to Pope until 7 P.M.⁶⁶

Lee's cavalry kept a close watch on Porter throughout the day on August 29th. The threat to Lee's right forced him to withhold Longstreet's Command from making an attack on Pope's forces. The twenty-ninth would pass with Pope making a series of Brigade size attacks on the left and center of Jackson's Command, while he waited for Porter and McDowell to make a strong attack on Jackson's right. Due to Porter's inaction in the face of Longstreet's troops to his front, that attack never came.⁶⁷ Pope was unaware of Longstreet's presence and failed to understand Porter's inaction. That night, Pope would order Porter to move to Groveton. With this move, the threat to Lee's right was removed.

On the twenty-ninth, both Lee's and Pope's cavalry picked up critical information. In Lee's case, he was notified almost immediately and rode out to personally observe the threat. Based on his observations and after consultations with Longstreet, he decided against any attack on the Union left while Porter's corps remained. In Pope's case, Buford's information would not reach him for twelve hours. When it did reach him, it was too late to take any actions to develop the information further. McDowell's oversight in not forwarding this information promptly was a critical mistake. When McDowell

received Buford's report he was with Porter, discussing what actions Porter should take in the face of the opposition of confederate troops to his front. Immediately after this conversation, McDowell decided to march his corps to the main battlefield at Groveton. Apparently, in the sequence of events of getting his corps on the road again he failed to forward Buford's message. In the end, Pope would ultimately misinterpret the information and conclude that the force Buford detected represented only a small part of Longstreet's command. Ricketts, as well as a regiment of cavalry from Bayard's brigade, knew well that they had fought significant forces from Longstreet's column at Thoroughfare Gap on the evening of the twenty-eighth. This piece of critical information combined with Buford's report might have changed Pope's mental model that Jackson was trying to retreat towards Lee, when in fact Lee had joined Jackson.

At 5 A.M. on August 30th, Pope believed that the enemy was still to his front, but badly hurt and beginning to retreat towards the mountains.⁶⁸ Pope believed Jackson to be arrayed perpendicular to the Warrenton Turnpike. He thought any forces from Longstreet that might join Jackson would reinforce Jackson's line.⁶⁹ Pope had done little to gain information on the twenty-ninth. Pope's corps commanders assigned the cavalry close in security tasks for the army's flanks and rear. After Buford's early morning report from Gainesville, Buford's and Bayard's depleted cavalry patrolled close in to the army's left flank, while Beardsley's forces patrolled to the army rear. Despite a full day in contact with Jackson, Pope did not understand Jackson's dispositions accurately and had no idea that Longstreet's entire command had joined Jackson and lay hidden at right angles to his left flank.

The morning of August 30th passed with a few brigade size fights, but no major attacks. Lee made plans to attack with Longstreet's Command if the Union forces attacked. Orders for the potential attack were issued. If the day passed quietly, Lee planned to maneuver Jackson into Pope's rear once again that night. Pope planned to attack Jackson's left with McDowell's, Porter's and Heintzelman's corps that morning. In preparation for the attack, McDowell and Heintzelman made a personal reconnaissance of Jackson's left. They did not find Jackson's troops where they had been the previous day. They concluded that Jackson was retreating, despite the earlier fights and the skirmishing at other points along the line.⁷⁰ Pope had separately reached this same conclusion from other reports while Porter and Heintzelman were out.

Pope issued an order for a pursuit of the enemy at noon on August 30th.⁷¹ He assigned this mission to McDowell and gave him Porter's and Heintzelman's corps to assist in execution. Porter, who had been subordinated to McDowell, would not receive notice of this change in plans from Pope's headquarters. He continued to pursue his morning instructions to attack Jackson. In gaining ground from which to launch the attack, he became embroiled in a hot fight with Jackson's forces and S.D. Lee's artillery. McDowell's pursuit became a hasty attack. At 2:30 P.M., Porter's corps, reinforced by a division, from McDowell's corps, attacked Jackson's left.

Jackson's forces were hard pressed under the weight of the 10,000 man attack. Jackson signaled to Longstreet for reinforcements. Longstreet realized it would take too long to send Jackson infantry. He quickly repositioned a few of his artillery batteries and added their fire to the already heavy fire of S.D. Lee's battalion of six batteries and Major Schumaker's battalion of eight batteries. The effect of the massed artillery fire was

devastating. Porter's attack crumpled and his forces began to fall back. At 4 P.M., Longstreet sensed that the decisive time had arrived. Longstreet issued the order to attack and 32,000 men surged forward into the Union left flank. Lee arrived at the same conclusion at almost the same moment. He issued the order to Longstreet to attack. By the time Lee's courier reached Longstreet, the attack was getting underway. Two hours later, General Pope's Army of Virginia began to retreat from the battlefield.

Conclusions

Information is a critical battlefield resource. It provides the commander leverage and options. Pope's inability for five days to get a clear picture of what Lee was doing meant that, on the afternoon of August 30th, he was operating with deeply flawed assumptions. Pope's experience during the Battle of Second Manassas shows organizational structure does affect information flow. Pope was definitely affected by the loss of information that was filtered, blocked or consolidated with other information as it traveled through his organizational hierarchy. His army had key information which never reached him, such as Sigel's report on the twenty-sixth that Jackson was marching to Manassas by way of Thoroughfare Gap, or Buford's report on the twenty-seventh of Longstreet's movements. Hierarchy of command also imposes time penalties on information flow. Information often has time value and becomes less useful with age. Twenty four hours would pass, after Pope's request that cavalry determine what was happening on the army's right, before McDowell would send Buford out towards Salem and White Plains in search of the Confederate Forces. On the twenty-ninth, twelve hours

would pass before Pope received Buford's report of a large column of infantry, artillery and cavalry passing through Gainesville.

Lee's experience was somewhat different. The information he received provided him the options and leverage to gain a competitive advantage on the battlefield of Second Manassas. Lee's courier service kept him apprised of Jackson's situation while they were separated. This allowed Lee to bring Longstreet's troops along at a slower pace which conserved their strength. During Jackson's flank march, Lee assigned Stuart to work directly for Jackson. Through Stuart's efforts, Jackson was aware of Pope's plans and the movement of his forces. Ultimately, Jackson, not Pope chose the time and place to initiate the Battle of Second Manassas by attacking King's division on the twenty-eighth. Upon reuniting with Jackson on the Manassas battlefield, Stuart once again reported directly to Lee and kept him informed. There was no intermediate level of command between them that could filter, delay or block the information flow. Lee knew quickly of Porter's threat and reacted by standing fast until the threat passed. Stuart's cavalry kept Lee well-informed of the major movements of Pope's army while successfully guarding the Army of Northern Virginia's flanks and rear.

Pope's mental model that Jackson was retreating towards Lee on the other side of the Bull Run mountains demonstrates the influence incorrect mental models can have on decisions within an organization. Pope had received some information that contradicted this view, but it came from sources outside his command. The information that might have changed Pope's mental model of the battlefield, such as Buford's reports, did not reach him. Information combined with previous knowledge can produce new information and knowledge. Had Pope received Buford's reports, he might have combined them with

previous knowledge to generate new combinations of information. Perhaps after placing this new information in the context of his experience, he might have changed his mental model of the battlefield.

Lee had better information on which to base his view of the battlefield. Lee's subordinates had worked together and with Lee longer than the commanders in Pope's army. As Lee received information, he was able to combine it with previous knowledge and confirm his mental model of the battlefield. Lee's three principal subordinates understood his view — his mental model. This allowed Lee to issue purpose-oriented orders and trust his subordinates to their execution. Jackson's mission to interdict the Orange and Alexandria railroad was open-ended, but Jackson understood Lee's intent.

Civil War armies on both sides had very small staffs. The commander performed most operations that today would be associated with operations and intelligence staff sections. This creates a situation in which the army was operating very close to a pure hierarchy (See *Figure 3*, p. 10). Without operations and intelligence staffs at each level of command, all operations and intelligence information flows along the chain of command from commander to commander. This can work and apparently did so in Lee's army. But there can also be problems. Information concerning Rickett's battle against Longstreet at Thoroughfare Gap might have reached Pope if there had been an alternative, routine communications channel between Pope and McDowell's headquarters. Likewise, reports such as Buford's observation of Longstreet on the twenty-seventh at Salem, or on the twenty-ninth at Gainesville, might have been forwarded if intelligence or operations staffs existed in the form they do today. Without alternate communications channels, the army is vulnerable to information corruption, delay, and blockage as information flows along

single hierarchical channels. The lack of multiple communications channels — horizontal, hierarchical and cross-hierarchical — in an army can decrease its efficiency and effectiveness and may expose it to failure.

The Army of Northern Virginia and the Army of Virginia fought with roughly equal capabilities in technologies and weapons. Many of their senior officers were educated in the same schools and shared similar formative military experiences prior to the Civil War. Yet, Lee's army won this battle and would win others. Was the difference between his army and Pope's merely attributable to better generalship, better leadership or superior soldiers? Though these intangible factors may or may not have had a role, there were definite structural differences.

The structure of armies can influence the outcomes of battles. Success in battle often goes to the army that is best organized structurally to acquire and process information and then act decisively on it to gain a competitive advantage. General Lee and General Pope assumed command of their respective armies within a month of each other in the Summer of 1862. However, Lee's Army of Northern Virginia had been together for a year and had many of its organizational issues worked out. Lee's smaller span of control seemed to reduce friction and enabled him to make more effective decisions. In contrast, Pope's Army of Virginia was assembled from three separate armies a month and a half before Lee moved to oppose them. As an organization, it had many issues to overcome. Pope's span of control was twice that of Lee's and may have led to problems in communications and complicated his decision making.

Additionally, the Union and Confederate armies organized and used their cavalry very differently. In the Army of Northern Virginia, the cavalry was consolidated into one

formation under the leadership of Jeb Stuart. During the Campaign of Second Manassas, Stuart received his missions directly from Lee, except for the period when Lee assigned him to support Jackson during his march into Pope's rear. Pope's cavalry, on the other hand, was subordinated to corps commanders. Pope had no cavalry formations that reported directly to him. Lee and Jackson both received the information they needed quickly. Pope's information was often delayed and, on occasion, blocked by the subordinate commands through which it had to travel. Thus on August 30, 1862, Lee had the information he needed to commit his army at the decisive time and place to win, while Pope pursued a flawed course of action based on incorrect information.

Had Pope's army been structured differently, the Battle of Second Manassas might have had a different outcome. Pope's army was numerically superior to Lee's. However without timely, accurate information Pope could not make good use of this significant advantage. If Pope had taken his cavalry reorganization one step further and consolidated his cavalry in a divisional structure with a single commander who reported directly to him, he might have had a much more effective information-gathering ability. This one step might have enabled key information to reach Pope without being blocked or delayed. Pope would likely have made very different decisions, if cavalry responsible directly to him had marched within hours of his 8:10 A.M. tasking on the twenty-sixth, rather than twenty-four later on the twenty-seventh. Cavalry reporting directly to Pope would likely have informed him of Longstreet's movements on the twenty-seventh, twenty-eighth and twenty-ninth. With correct information, Pope would have been operating with a clearer picture of the battlefield and might have chosen a better course of action that could have led to victory instead of defeat.

Lee and Pope fought on a battlefield in Virginia in 1862, but that battlefield shares common traits with battlefields today. The commander of a modern military organization must understand how organizational structure affects information flow within his organization and take steps to prevent or lessen its impact. This requires more than a technological solution. Technology that moves information faster through an organization does not necessarily overcome the organizational friction created by poor structure. To survive and win on the battlefield, military organizations must very efficiently use what information they gain. To do this, they must make full use of their intellectual resources — their organizational intelligence.

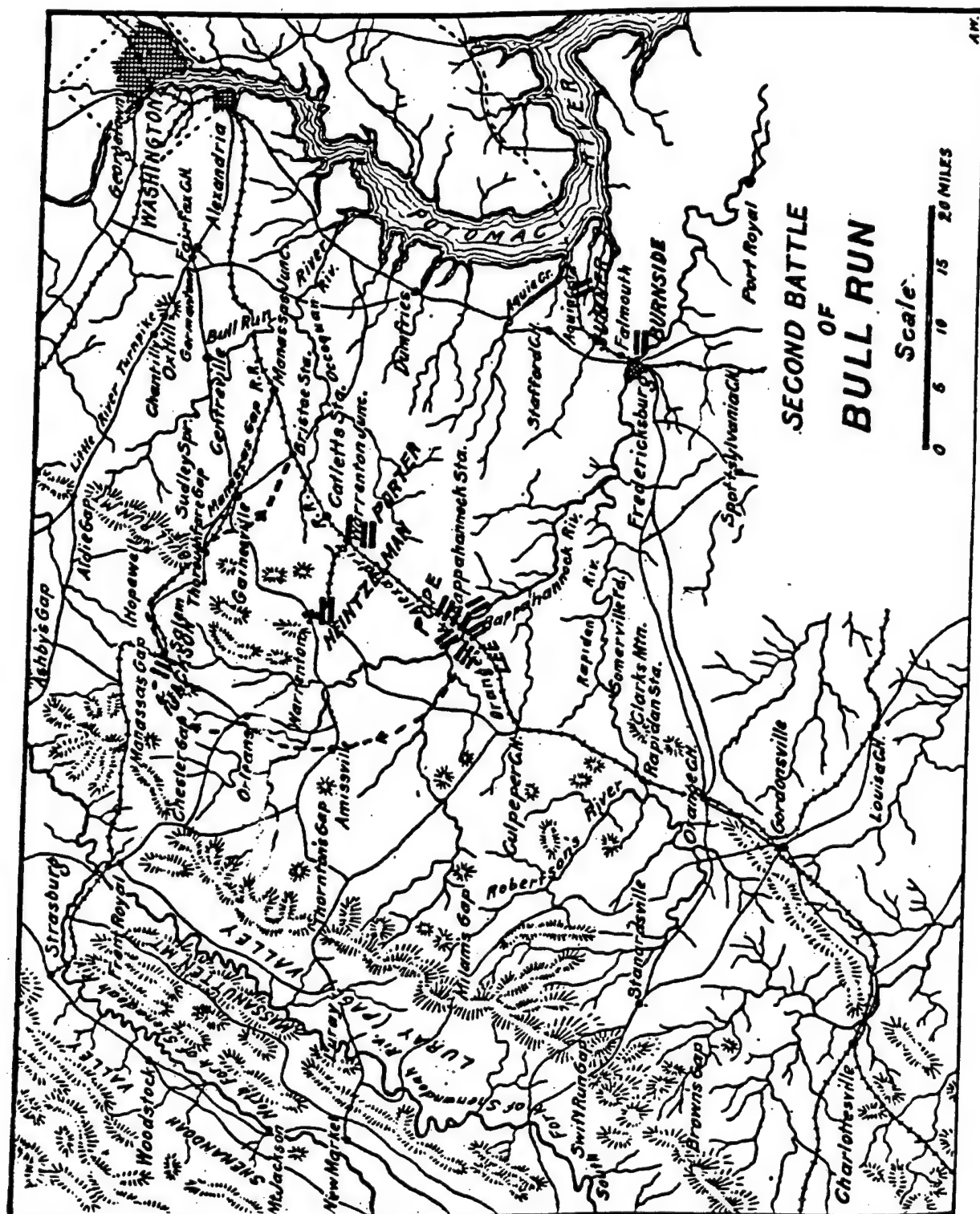
Organizational Intelligence is the foundation of organizational learning, adaptation and survival. Armies are composed of thousands of highly trained, experienced soldiers. Military organizations cannot depend on the intellectual capabilities of one or a few senior leaders, but must harness the intellectual potential of the entire organization.

Organizational intelligence emerges from the interconnections within the organization. Organizational intelligence enables organizations to make use of information to generate new knowledge, learn, adapt to complex environments, and ultimately survive as an organization. A modern military organizational structure must provide flexible communications with an emphasis on networked horizontal linkages both within and external to their organization. Commanders of these organizations must decentralize control and task execution to the maximum extent possible consistent with maintaining direction of purpose.

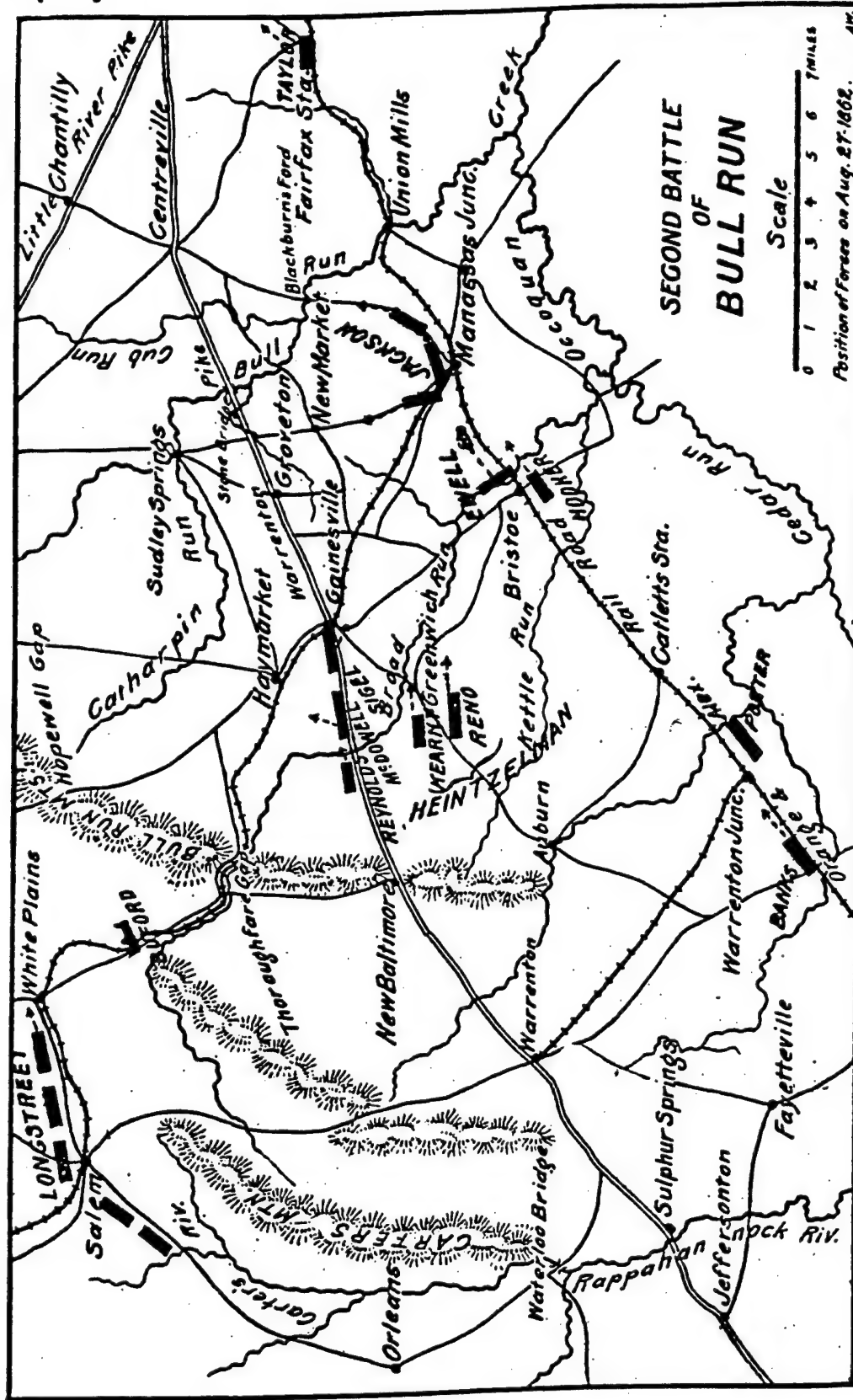
Commanders must be sensitive to the effects of hierarchical systems. Hierarchical structure allows narrower spans of control; it also leads to problems in information flow.

Commanders must identify those critical information-producing organizations or assets and insure that his organizational structure provides him with both the means to directly control their use and to receive information from them. Information provides the commander with leverage on the battlefield. It provides him options.

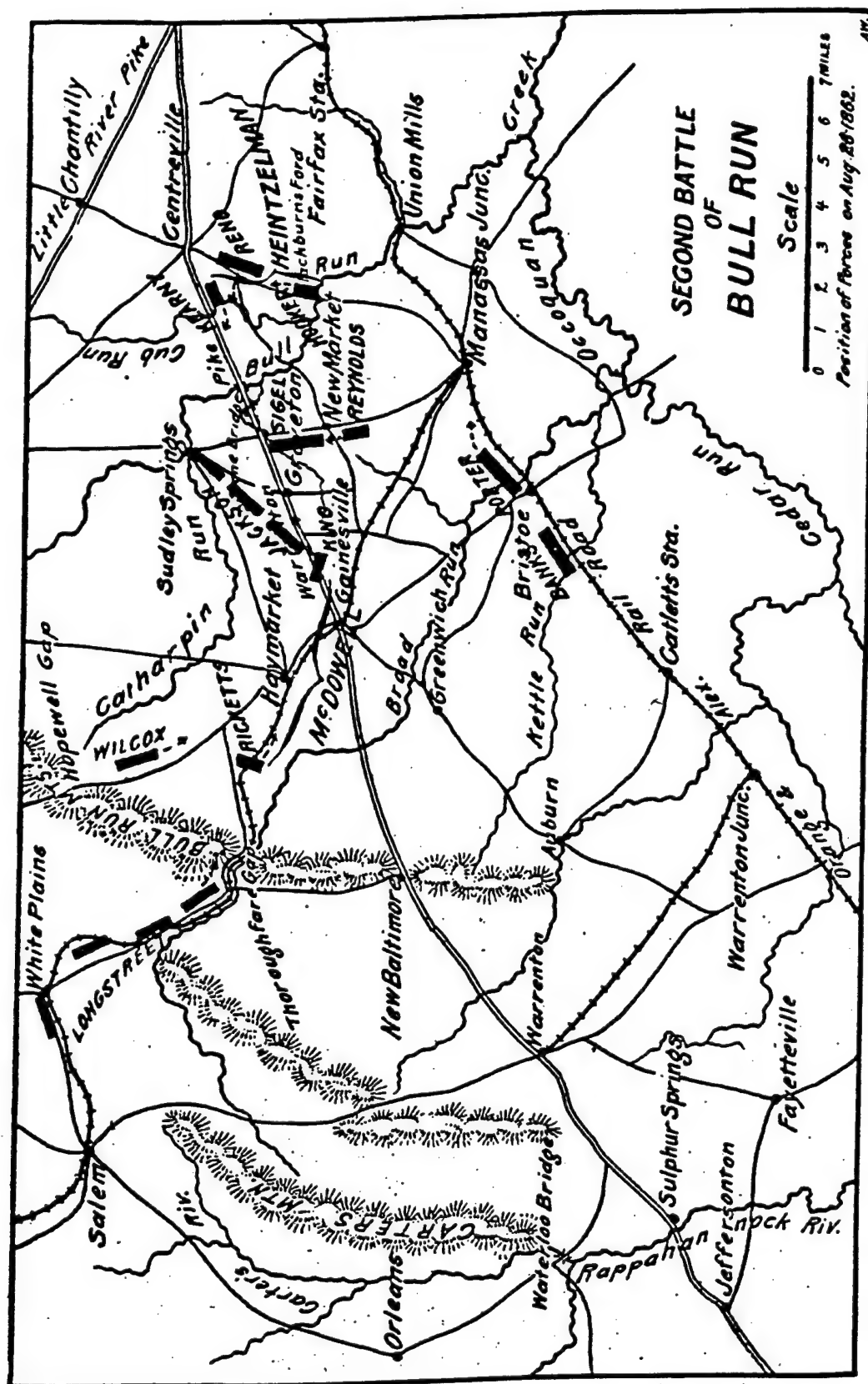
A commander's ability to accomplish his mission is influenced by the structure of his organization. Structure defines the organization's communications pathways. It determines the amount of hierarchy, the amount of sub-unit compartmentalization, and the span of control of the organization's leaders. Structure determines an organization's communications environment. Each of these elements affect information flow within the organization, and thus directly affects the commander's ability to correctly visualize the decisive point on the battlefield to achieve victory.



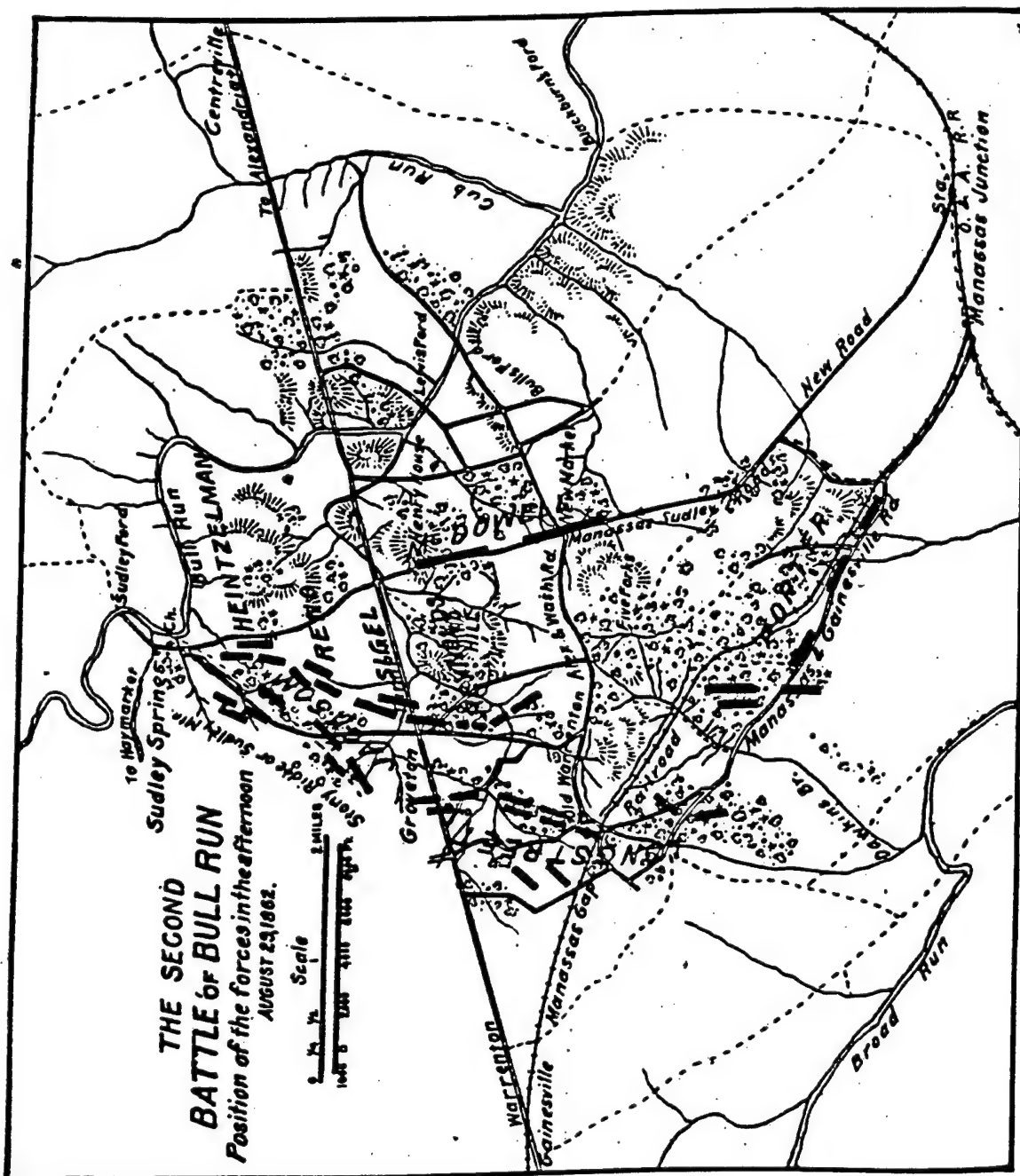
Map 1 — Jackson's Route 25-27 August 1862⁷²



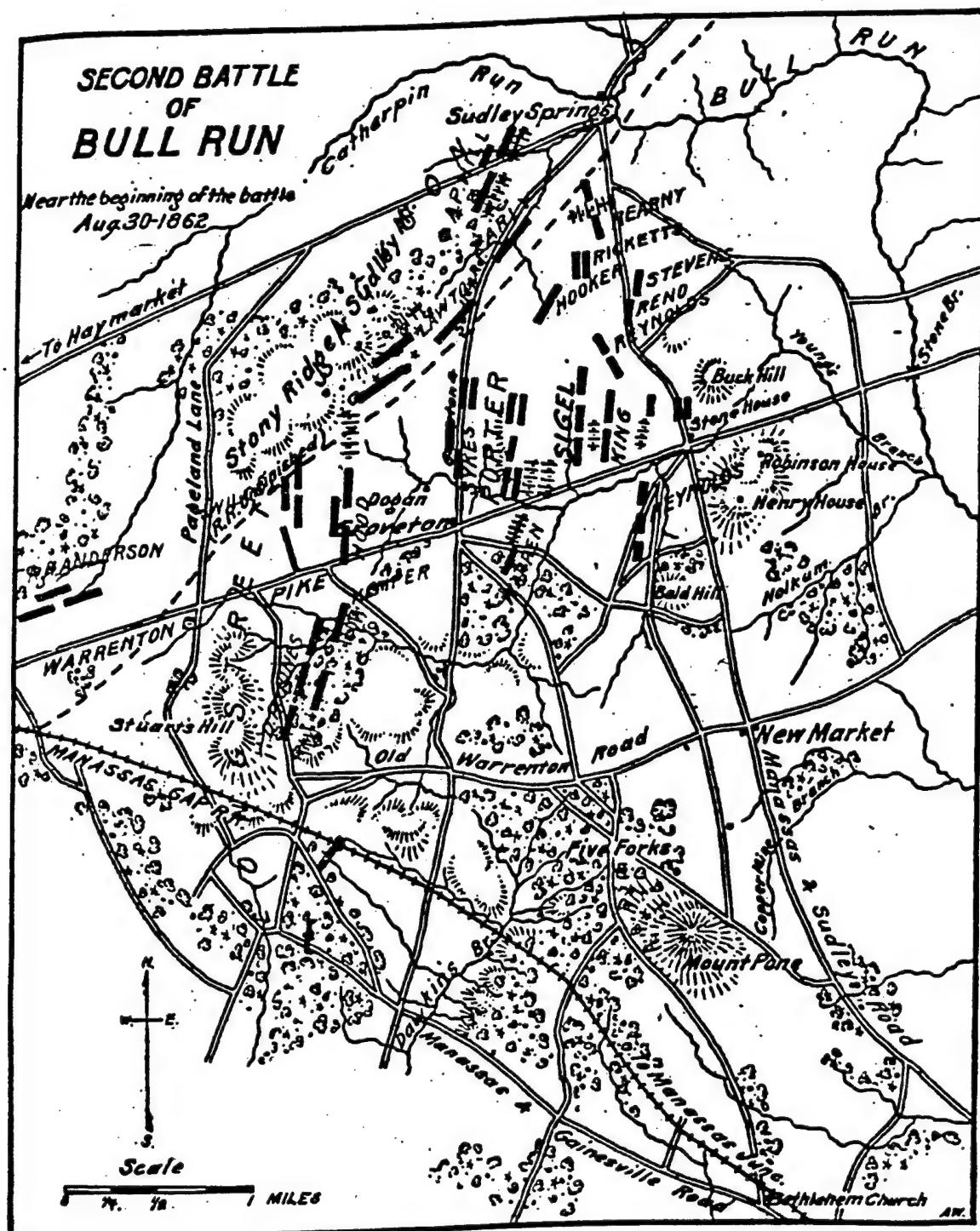
Map 2 — Disposition of Forces on August 27, 1862⁷³



Map 3 — Disposition of Forces on August 28, 1862⁷⁴

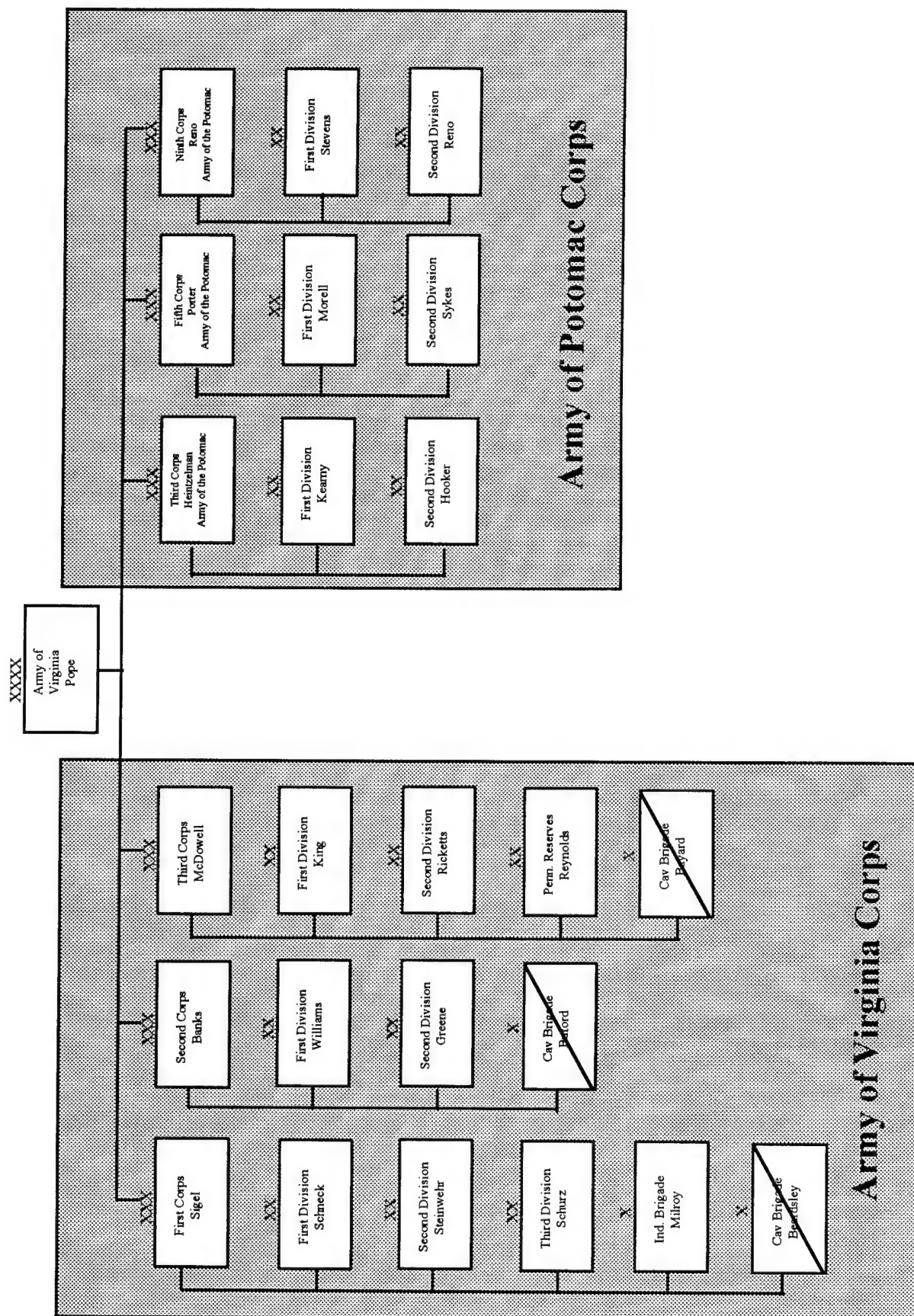


Map 4 — Disposition of Forces on Manassas Battlefield, Afternoon, August 29, 1862⁷⁵

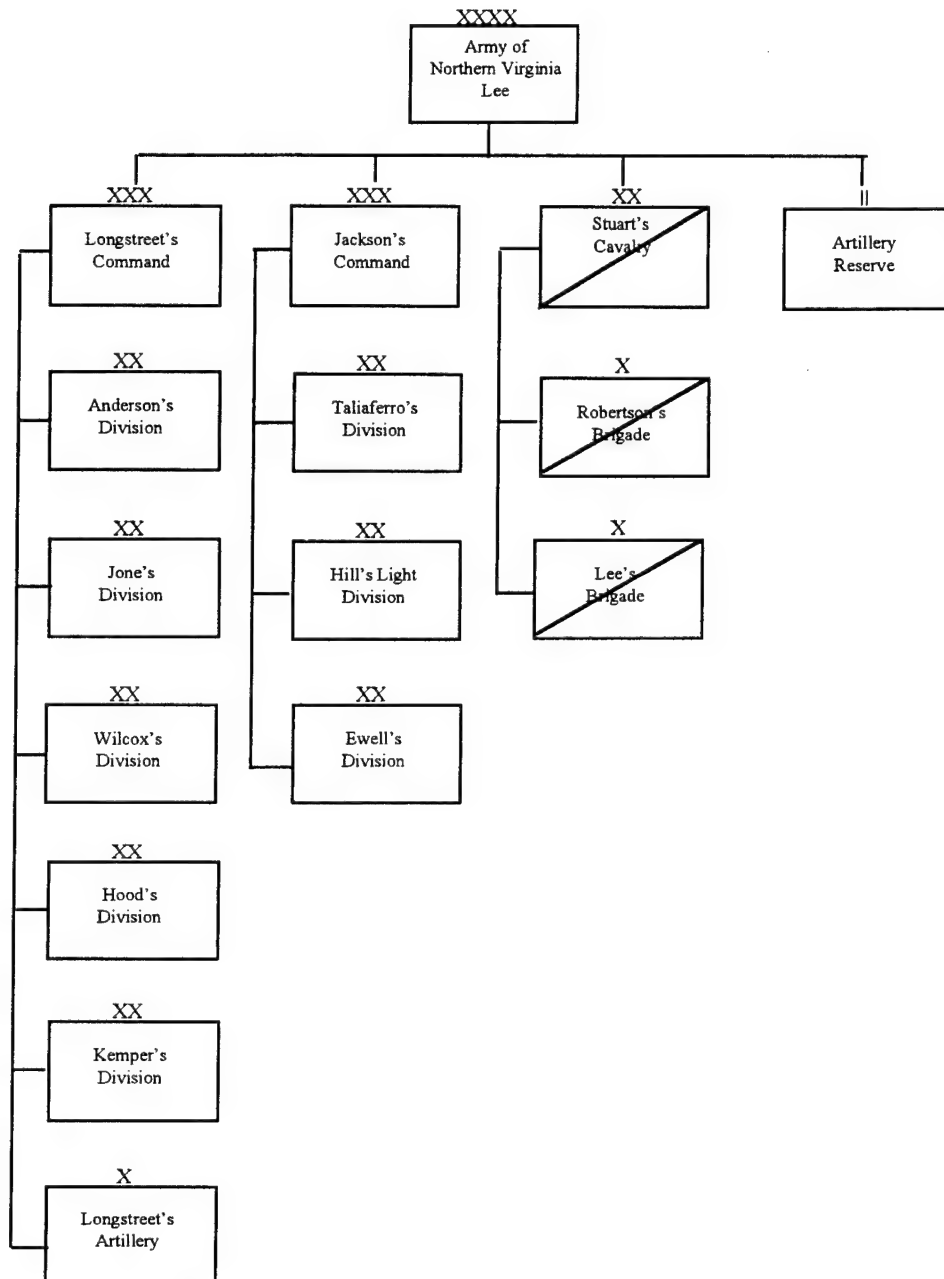


Map 5 — Disposition of Forces on the Manassas Battlefield, August 30, 1862⁷⁶

Appendix B — Organizational Diagrams



Appendix B — Organizational Diagrams



Notes

¹ U.S. Army, "The Battalion and Brigade Battle Staff," *CALL Newsletter*, (Ft. Leavenworth: Center For Army Lessons Learned, Newsletter 93-3, July 93), 34.

² Christopher Duffy, "The Berlin Watch Parade' at Bay — Rossbach and Leuthen 1757," *The Army of Frederick the Great*, (New York: Hippocrene Books, 1974), 174-180, 222-224, contained in Combat Studies Institute, *The Evolution of Modern Warfare - Term I Syllabus / Book of Readings*, (Ft. Leavenworth, KS: U.S. Army Command and General Staff College, 1995), 81-89.

³ Martin van Creveld, *Command In War*, (Cambridge: Harvard University Press, 1985), 265.

⁴ Peter M. Senge, *The Fifth Discipline*, (New York: Currency Doubleday, 1990), 40.

⁵ Robert M. Epstein, "The Creation and Evolution of the Army Corps in the American Civil War," *The Journal of Military History* 55 (Jan 91): 21.

⁶ Peter G. Tsouras, *Warriors Words*, (London: Arms and Armour Press, 1994), 257.

⁷ Sun Tzu, *The Art of War*, ed. By Samuel B. Griffeth, (Oxford: Oxford University Press, 1963), 143-149.

⁸ *The American Heritage® Dictionary of the English Language, Third Edition* [CD-ROM], (Houghton Mifflin Company, 1992); Electronic version licensed from InfoSoft International, Inc.; Contained in Microsoft Bookshelf © 1987 - 1995 Microsoft Corporation.

⁹ The concept of the hierarchical relationship and the rough meanings of data, information and knowledge are derived from Morton F. Meltzer, *Information: The Ultimate Management Resource, How to Find, Use, and Manage It*, (New York: AMACOM, 1981), 7-8. A similar discussion of an information hierarchy can be found in Anthony Debons, Esther Horne, and Scott Cronenweth, *Information Science, An Integrated View*, (Boston: G.K. Hall & Co., 1988), 5-8. To this general concept of a hierarchical relationship I have added intelligence.

¹⁰ I am using *intelligence* here in the cognitive sense, not in the military sense of information on enemy forces in a military operation.

¹¹ Michael D. McMaster, *The Intelligence Advantage, Organizing for Complexity*, (Boston: Butterworth-Heinemann, 1996), 10.

¹² *Ibid.*, 60-61.

¹³ This model was originally developed by Shannon and Weaver in their classic 1948 work on information theory *The Mathematical Theory of Communications*. This model is the most widely accepted fundamental description of the communications process and is cited widely by many authors. Claude Shannon and Warren Weaver, *The Mathematical Theory of Communications*, (Urbana: University of Illinois Press, 1948) cited in James L. Gibson, John M. Ivancevich, and James H. Donnelly, Jr., *Organizations: Structure, Processes, Behavior*, (Dallas: Business Publications, Inc., 1973), 165-168.

¹⁴ Senge, 8.

¹⁵ *Ibid.*, 174-204.

¹⁶ John W. Bodnar and Rebecca Dengler, "The Emergence of a Command Network," *Naval War College Review* Vol XLIX, No. 4, Seq 356 (Autumn 1996), 94-97.

¹⁷ *Ibid.*

¹⁸ Van Creveld, 261-265.

¹⁹ Hennessy, 5.

²⁰ The Army of Virginia was formed from the union of three separate armies: The Mountain Department under command of MG Frémont — became I Corps, the Shenandoah Department under MG Banks — became II Corps, and the Department of the Rappahannock under the command of MG McDowell except those within the fortifications of Washington — became III Corps. MG Frémont refused to serve under Pope and was replaced by MG Sigel. MG Pope's orders were to operate so as to protect Western Virginia and the national capital from danger or insult and in the speediest manner to attack to overcome rebel forces operating under Jackson and Ewell, threatening the enemy in the direction of Charlottesville, and render the most effective aid to relieve MG McClellan and capture Richmond. OR, XII, P.III, 435. Total forces approximately 51,000 men. Hennessy, 6.

²¹ *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, (Washington: GPO, 1885), ser. I, Vol. XII, Pt. III), 435. This source is cited hereafter as OR.

²² All strength numbers in this paragraph are derived from the figures listed in the Appendix *Organization, Strength and Losses* in Stackpole's *From Cedar Mountain to Antietam*. Stackpole, 451-454.

²³ Organization of the Army of Virginia; OR, ser. I, vol. XII, pt. III, 581-585.

²⁴ Hennessy, 6-7.

²⁵ Ibid., 581.

²⁶ Stackpole, 452-454..

²⁷ John J. Hennessy, *Return to Bull Run, The Campaign and Battle of Second Manassas*, (New York: Simon and Schuster, 1994), 22-23.

²⁸ Edward J. Stackpole, *From Cedar Mountain to Antietam, August - September, 1862*, (Harrisburg, PA: The Stackpole Company, 1959), 83-87.

²⁹ Hennessy, 74-80.

³⁰ Freeman, *R.E. Lee*, 299-303; and Hennessy, 92-94.

³¹ Edward Hagerman, *The American Civil War and The Origins of Modern Warfare*, (Bloomington, IN: Indiana University Press, 1988), 110.

³² Louis H. Manarin, "Lee in Command: Strategical and Tactical Policies" (Ph.D. diss., Duke University, 1964), 585.

³³ The Confederate Legislature recognized and formally authorized Lee's corps formation on 1 Nov 1862. Corps were subsequently formed in the other Confederate armies. Douglas Southhall Freeman, *Lee's Lieutenants, A Study in Command, Volume 1, Manassas to Malvern Hill*, (New York: Charles Scribner's Sons, 1942), 671.

³⁴ Organization of the Army of Northern Virginia; OR, ser. I, vol. XII, pt. II, 546-551.

³⁵ Hennesy, 315; and for the number of batteries see OR, ser. I, vol. XII, pt. II, 548.

³⁶ Hagerman, 110.

³⁷ Manarin, 588.

³⁸ Hennessy, 96.

³⁹ Pope to Sigel; OR, ser. 1, vol. XII, pt. II, 65.

⁴⁰ Series of three messages at 8:45 A.M., 9:30 A.M., and 10:30 A.M. from Clark to Banks; and one message from Banks to Colonel Ruggles (Pope's Chief of Staff); OR, ser. 1, vol. XII, pt. III, 654-655.

⁴¹ Pope to Halleck; OR, ser. 1, vol. XII, pt. III, 653.

⁴² Sigel's official report; OR, ser. 1, vol. XII, pt. II, 271.

⁴³ General Orders #8, HQ's Third Army Corps, 25 Aug 62; OR, ser. 1, vol. XII, pt. III, 657-658.

⁴⁴ Pope to Sigel; Pope to McDowell; OR, ser. 1, vol. XII, pt. II, 67. The message to Reno does not appear in the Official Records, however the reference to it and Reno's inability to comply may be found in an 8:10 A.M., 26 Aug 62 message from Pope to McDowell. OR, ser. 1, vol. XII, pt. I, 211.

⁴⁵ Pope to McDowell; OR, ser. 1, vol. XII, pt. I, 211.

⁴⁶ Vass James and W.H. Lewis. "Statements concerning communications between General Robert E. Lee and General Thomas J. Jackson before and during the Second Battle of Manassas (26-28 Aug 1862)." Virginia State Library. as cited in Hennessy, 94.

⁴⁷ Kelly, 14.

⁴⁸ Stuart's official report; OR, ser. 1, vol. XII, pt. II, 741.

⁴⁹ McDowell to Pope; OR, ser. 1, vol. XII, pt. II, 349-350.

⁵⁰ White to Pope; OR, ser. 1, vol. XII, pt. III, 682.

⁵¹ McDowell to Pope; OR, ser. 1, vol. XII, pt. II, 69.

⁵² Ibid., 351.

⁵³ Sigel's official report; OR, ser. 1, vol. XII, pt. II, 264.

⁵⁴ Pope to McDowell; OR, ser. 1, vol. XII, pt. II, 70.

⁵⁵ Welcher, 921.

⁵⁶ Beardsley's official report; OR, ser. 1, vol. XII, pt. II, 271.

⁵⁷ McDowell's official report; OR, ser. 1, vol. XII, pt. II, 335.

⁵⁸ Pope's official report; OR, ser. 1, vol. XII, pt. II, 34.

⁵⁹ Dowdey, 265. See document 279 Lee to Davis, 27 Aug 62 via telegraph 2.5 miles from Salem.

⁶⁰ Pope to McDowell; OR, ser. 1, vol. XII, pt. II, 72.

⁶¹ Pope's official report; OR, ser. 1, vol. XII, pt. II, 37.

⁶² OR, ser. 1, vol. XII, pt. II, 74-76. See Pope's messages to Kearney, Heintzelman and Porter.

⁶³ Pope's official report; OR, ser. 1, vol. XII, pt. II, 38.

⁶⁴ Stackpole, 146.

⁶⁵ Freeman, *R.E. Lee*, 317-322.

⁶⁶ See Buford to Ricketts and Ricketts to McDowell; OR, ser. 1, vol. XII, pt. III, 730. For the time that Pope received the message from McDowell see OR, ser. 1, vol. XII, pt. II - Supplement, 853. This is Pope's statement of when he received McDowell's forwarding of Buford's message. This statement was made in the context of Pope defending his lack of knowledge before Porter's Court Martial that Longstreet had arrived on the field. If Pope had known earlier in the day that Longstreet had arrived, Porter's defense against Pope's charges of failing to obey orders would have been stronger. McDowell does not mention passing this information to Pope, nor do any of his recorded messages on the twenty-ninth mention Buford's report.

⁶⁷ The controversy over Porter's inaction would lead to his court-martial and conviction. Twenty years later he would be exonerated.

⁶⁸ Pope to Halleck OR, ser. 1, vol. XII, pt. III, 741.

⁶⁹ Pope's testimony at the Porter court martial; OR, ser. 1, vol. XII, pt. II - Supplement, 850-851.

⁷⁰ McDowell's official report. OR, ser. 1, vol. XII, pt. II, 339-340.

⁷¹ Army of Virginia Special Orders, noon, 30 Aug 62; OR, ser. 1, vol. XII, pt. II, 361.

⁷² Matthew Forney Steele, *American Campaigns, Volume II — Maps*, (Washington, DC: War Department, Office of the Chief of Staff, 1909), 123.

⁷³ Ibid., 125.

⁷⁴ Ibid., 126.

⁷⁵ Ibid., 128.

⁷⁶ Ibid., 130.

Bibliography

Books

- Beniger, James R. *The Control Revolution, Technological and Economic Origins of the Information Society*. Cambridge: Harvard University Press, 1986.
- Beringer, Richard E., Herman Hattaway, Archer Jones and William N. Still, Jr. *Why the South Lost the Civil War*. Athens: University of Georgia Press, 1986.
- Blau, Peter M. and Richard A. Schoenherr. *The Structure of Organizations*. New York: Basic Books, 1971.
- Cleland, David I. And William R. King. *Management: A Systems Approach*. New York: McGraw Hill, 1972.
- Cleveland, Harlan. *The Knowledge Executive*. New York: Truman Talley Books, 1985.
- Coakley, Thomas P. *Command and Control for War and Peace*. Washington, DC: National Defense University Press, 1992.
- Davis, Burke. *Jeb Stuart The Last Cavalier*. New York: Rinehart and Company, 1957.
- Debons, Anthony, Esther Horne, and Scott Cronenweth. *Information Science — An Integrated View*. Boston: G.K. Hall & Co., 1988.
- Dowdey, Clifford, ed. *The Wartime Papers of R.E. Lee*. Boston: Little, Brown and Company, 1961.
- Dwight, Theodore F. ed. *The Virginia Campaign of 1862 Under General Pope*. Papers of the Military Historical Society of Massachusetts, vol II. Boston: Houghton Mifflin and Company, 1895.
- Freeman, Douglas S. *R.E. Lee, A Biography*. Vol. II. New York: Charles Schribner's Sons, 1934.
- Freeman, Douglas S. and Grady McWhiney, eds. *Lee's Lieutenants: A Study in Command*. 3 Vols. New York: Charles Schribner and Sons, 1942-44.
- Freeman, Douglas S. ed. *Lee's Dispatches, Unpublished Letters of General Robert E. Lee, C.S.A. to Jefferson Davis and the War Department of The Confederate States of America 1862-1865*. New York: G.P. Putnam's Sons, 1957.

- Galbraith, Jay. *Designing Complex Organizations*. Reading, MA: Addison Wesley Publishing Co., 1973.
- _____. *Organization Design*. . Reading, MA: Addison Wesley Publishing Co., 1977.
- Gibson, James L., John M. Ivancevich and James H. Donnelly, Jr. *Organizations — Structure, Processes, Behavior*. Dallas, TX: Business Publications, Inc, 1973.
- Glatthaar, Joseph T. *Partners in Command*. New York: The Free Press, 1994.
- Golembiewski, Robert T. *Organizing Men and Power: Patterns of Behavior and Line Staff Models*. Chicago: Rand McNally, 1967.
- Gordon, George H. *History of the Campaign of The Army of Virginia from Cedar Mountain to Alexandria, 1862*. Boston: Houghton, Osgood and Company, 1880.
- Hagerman, Edward. *The American Civil War and the Origins of Modern Warfare*. Bloomington: Indiana University Press, 1988.
- Hammer, Michael and James Champy. *Reengineering the Corporation*. New York: HarperBusiness, 1993.
- Hattaway, Herman and Archer Jones. *How the North Won*. Urbana: University of Illinois Press, 1991.
- Heilprin, Laurance B., ed. *Toward Foundations of Information Science*. White Plains, NY: Knowledge Industry Publications, Inc., 1985.
- Hennessy, John J. *Return to Bull Run*. New York: Simon and Schuster, 1993; Touchstone, 1994.
- Johnson, R. U. and C. C. Buel, eds. *Battles and Leaders of the Civil War*. 4 Vols. New York, 1884-1888.
- Johnson, Stuart E. and Alexander H. Levis, eds. *Science of Command and Control — Coping With Uncertainty*. Washington, DC: AFCEA International Press, 1988.
- _____. *Science of Command and Control — Coping With Complexity*. Washington, DC: AFCEA International Press, 1989.
- Jones, Archer. *Civil War Command and Strategy*. New York: The Free Press, 1992.
- Kast, Fremont E. and James E. Rosenzweig. *Organization and Management, A Systems and Contingency Approach*. New York: McGraw Hill Book Co., 1979.
- Katcher, Philip. *The Civil War Source Book*. New York: Facts on File, 1992.

- Kelly, Dennis. *The Battle and Campaign — Second Manassas*. Harrisburg: Civil War Times Illustrated, 1983; Eastern Acorn Press, 1983.
- Long, A.H. *Memoirs of Robert E. Lee*. New York: J.M. Stoddart and Company, 1886.
- Longacre, Edward G. *General John Buford*. Pennsylvania: Combined Books, 1995.
- Longstreet, James. *From Manassas to Appomatox; Memoirs of the Civil War in America*. Philadelphia, 1896.
- Mackenzie, Kenneth D. *Organizational Design*. Norwood, NJ: Ablex Publishing Corp., 1986.
- Machlup, Fritz and Una Mansfield, eds. *The Study of Information*. New York: John Wiley and Sons, 1983.
- McMaster, Michael D. *The Intelligence Advantage, Organizing for Complexity*. Boston: Butterworth-Heinemann, 1996.
- Meltzer, Morton F. *Information: The Ultimate Management Resource*. New York: AMACOM, 1981.
- Mintzberg, Henry. *Structure in Fives — Designing Effective Organizations*. Englewood Cliffs, NJ: Prentice Hall, 1993.
- Mitchell, Joseph B., Lieutenant Colonel. *Decisive Battles of the Civil War*. G.P. Putnam's Sons, 1955.
- Ropes, John Codman. *The Army Under Pope*. New York: Charles Scribner and Sons, 1882.
- Schutz, Wallace J. and Walter N. Trenerry. *Abandoned by Lincoln, A Military Biography of General John Pope*. Urbana, IL: University of Illinois Press, 1990.
- Stackpole, Edward J. *From Cedar Mountain to Antietam, August - September 1862*. Harrisburg: The Stackpole Company, 1959.
- Starr, Stephen Z. *The Union Cavalry in the Civil War*. Vol. 1. *From Fort Sumter to Gettysburg 1861 - 1863*. Baton Rouge: Louisiana State Press, 1979.
- Van Creveld, Martin. *Command in War*. Cambridge: Harvard University Press, 1985.
- Welcher, Frank J. *The Union Army, 1861-1865, Organizations and Operations, Volume I: The Eastern Theater*. Bloomington, IN: Indiana University Press, 1989.

Wheatley, Margaret. *Leadership and the New Science*. San Francisco: Berrett-Koehler Publishers, 1992.

Whitehorne, Joseph, W. A. *The Battle of Second Manassas*. Washington, D.C.: GPO, 1990.

Zand, Dale E. *Information, Organization, and Power*. New York: McGraw Hill, 1981.

Dissertations, Theses, and Technical Reports

Bolger, John T. "The Different Mask of Lee's Command, April 1861 - June 1862: The Preparation of a Commander." U.S. Army War College, 1991.

Cox, Merlin G. "John Pope, Fighting General From Illinois." Ph.D. diss., University of Florida, 1956.

Cuddy, Jack C. "Lee's Maryland Campaign: Opportunity Lost." Master's Thesis, Naval War College, 1995.

Dungan, Mark A. "Robert E. Lee The Operational Commander: A Star on His Own Course." Master Thesis, Naval War College, 1996.

English, John Alan. "Confederate Field Communications." Master's thesis, Duke University, 1964.

Gibbs, Shirley M. "Lee's Command Procedures." Master's thesis, Duke University, 1962.

Goebel, David P. "Organizational Turbulence and Army Performance: A Comparison of the Confederate Army of Northern Virginia and the Army of Tennessee." Master's Thesis, U.S. Army Command and General Staff College, 1993.

Hodges, Frederick B. "Lee Builds an Army: From Malvern Hill to Second Manassas." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1993.

Hough, Michael A. "Campaign of the Second Battle of Manassas, August 1862." U.S. Army War College, 1987.

Johnson, Robert Lewis. "Confederate Staff Work at Chickamagua: An Analysis of the Staff of the Army of Tennessee." Master's Thesis, U.S. Army Command and General Staff College, 1992.

Kahan, James P., D. Robert Worley and Cathleen Stasz. *Understanding Commander's Information Needs*. Santa Monica, CA: RAND, Arroyo Center, 1989.

- Manarin, Louis H. "Lee in Command: Strategic and Tactical Policies." Ph.D. diss., Duke University, 1964.
- Pistilli, David B. "Start Making Sense — Managing the Command's Information." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1995.
- Sanders, Charles. "On Command: An Illustrative Study of Command and Control in the Army of Northern Virginia, 1863." Master's Thesis, Naval War College, 1991.
- Schaefer, James Arthur. "The Tactical and Strategic Evolution of Cavalry During the American Civil War." Ph.D. diss., The University of Toledo, 1982.
- Smith, James R. "Opportunities Gained and Lost: J.E.B. Stuart's Cavalry Operations in the Seven Days Campaign." Master's Thesis, U.S. Army Command and General Staff College, 1994.
- Stith, Shawn B. "Foundation for Victory: Operations and Intelligence Harmoniously Combine in Jackson's Shanandoah Campaign (1862)." Master's Thesis, U.S. Army Command and General Staff College, 1993.
- Stricker, Mark R. "Dragoon or Cavalryman, Major General John Buford in the American Civil War." Master's Thesis, U.S. Army Command and General Staff College, 1994.
- Theile, Thomas F. "The Evolution of Cavalry in the American Civil War; 1861-1863." Ph.D. diss., University of Michigan, 1951.
- Thomas, Kent. "Second Manassas: An Operational Dynamics Perspective." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1988.

Papers

- Bodnar, John W. and Rebecca Dengler. "The Emergence of A Command Network." *Naval War College Review* XLIX, 4 (Autumn 96) 93-107.
- Epstein, Robert M.. "The Creation and Evolution of the Army Corps in the American Civil War." *The Journal of Military History* 55 (Jan 91): 21.

Government Documents

- Steele, Matthew Forney. *American Campaigns*. Vol I-Text. Washington: War Department, 1909.

_____. *American Campaigns*. Vol II - Maps. Washington: War Department,
1909.

War Department. *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*. Washington, Series I, Vol. XII, Pt. 1, D.C.: GPO, 1885.

War Department. *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*. Washington, Series I, Vol. XII, Pt. 2, D.C.: GPO, 1885.

War Department. *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*. Washington, Series I, Vol. XII, Pt. 2- Supplement, D.C.: GPO, 1885.

War Department. *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*. Washington, Series I, Vol. XII, Pt. 3, D.C.: GPO, 1885.